

**SOCIETÀ NAZIONALE DI SCIENZE, LETTERE E ARTI IN NAPOLI
MEMORIE DELL'ACCADEMIA
DI SCIENZE FISICHE E MATEMATICHE**

P. TENJES G. BUSARELLO G. LONGO

**TRIAxIAL ELLIPTICAL GALAXIES
WITH DUST LANES: AN ATLAS
OF VELOCITY FIELDS**

LIGUORI EDITORE

Pubblicato da Liguori Editore
Via Mezzocannone 19, 80134 Napoli

© Liguori Editore, S.r.l., 1993

I diritti di traduzione, riproduzione e adattamento, totale o parziale, sono riservati per tutti i Paesi. Nessuna parte di questo volume può essere riprodotta, registrata o trasmessa con qualsiasi mezzo: elettronico, elettrostatico, meccanico, fotografico, ottico o magnetico (comprese copie fotostatiche, microfilm e microfiches).

Prima edizione italiana Febbraio 1993

9 8 7 6 5 4 3 2 1 0

2000 1999 1998 1997 1996 1995 1994 1993

Le cifre sulla destra indicano il numero e l'anno dell'ultima ristampa effettuata

Printed in Italy, Officine Grafiche Liguori, Napoli

ISBN 88-207-2285-2

Triaxial elliptical galaxies with dust lanes: an atlas of velocity fields

Peeter Tenjes^(1,2), Giovanni Busarello⁽²⁾, Giuseppe Longo⁽²⁾

⁽¹⁾ Tartu Astrophysical Observatory, Tartu, Estonia

⁽²⁾ Osservatorio Astronomico di Capodimonte, Napoli, Italy

Summary: We present an atlas of velocity fields and expected rotation curves along both the major and minor axis of triaxial elliptical galaxies with dust lanes and gas disks. The atlas covers galaxies with apparent ellipticity between 0 and 0.6 and allows a straightforward comparison of the observational data with the predictions of the models.

1. Introduction

During the past decade, evidence has grown that elliptical galaxies, as well as the bulges of lenticular and spiral galaxies, may be triaxial in shape rather than spheroidal. The first hint came from the discovery that most E-type galaxies rotate much too slow to account for their observed flattening (Bertola and Capaccioli 1975, Illingworth 1977). The subsequent explanation in terms of anisotropic velocity dispersion tensors (Binney 1978) lead to the hypothesis that elliptical galaxies could be (but not necessarily are) triaxial in shape, thus starting a renaissance of the studies on the structure of elliptical galaxies.

In 1983, Davies et al. found that the brighter elliptical galaxies have the higher degree of anisotropy. Bender (1988) found that highly anisotropic objects are very likely to have “boxy-shaped” isophotes. It must be pointed out, furthermore, that if the effect of the integration of light along the line of sight is taken into account, the level of significance of the correlation is greatly reduced (Busarello et al. 1992).

If triaxiality is taken into account, the modelling of the intrinsic structure of E galaxy becomes highly degenerate (Contopoulos 1956, Stark 1977, Rybicki 1987) and cannot be solved on the basis of photometry alone. Two possible additional observational constraints are available:

- a sizeable fraction of elliptical galaxies contains a gas disk or a dust lane (c.f. Demoulin-Ulrich et al. 1984, Bertola 1987). Equilibrium configuration of cold gas in a triaxial potential occur only in a small number of preferred planes (Gunn 1979, Habe and Ikeuchi 1985, 1988). The geometry of such disks can therefore be used to constrain the viewing angles and the intrinsic axial ratios of the iso-density surfaces (de Zeeuw et al. 1986).
- statistical analysis of apparent ellipticities and observed velocity fields of early type galaxies enables to derive the probability distributions of intrinsic triaxialities (Binney 1985).

The projection of stellar velocity fields for triaxial galaxies has been attempted by several authors. Binney (1985) explored two extreme cases with the angular momentum parallel to either the shortest or to the longest axis. It needs to be pointed out, however, that the exact direction of the angular momentum depends on the balance between the momenta of the short and long axis tube orbits (Franx et al. 1991).

In order to allow a better comparison of observational data and model predictions we present here

an atlas of velocity fields for triaxial galaxies with gas disks or dust lanes.

2. Method

We adopt a conventional coordinate system, with the shortest axis of a triaxial galaxy oriented along the z axis, the longest axis along the x axis and the intermediate one along the y axis. The direction to the observer is determined by its polar coordinates θ and ϕ (Fig. 1).

The assumed luminosity density distribution is given by the modified Hubble profile (Binney and Tremaine 1987)

$$l = L_o(a_v^2 + r_o^2)^{3/2}, \quad (1.1)$$

$$a_v^2 = x^2 + \frac{y^2}{\zeta^2} + \frac{z^2}{\xi^2}, \quad (1.2)$$

where ζ and ξ are the axial ratios (assuming that $1 \geq \zeta \geq \xi$). Let (x', y', z') be coordinates defined in such a way that z' is directed to the observer and x', y' lie on the plane of the sky. Coordinates (x, y, z) and (x', y', z') are related by the rotation matrix

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} -\sin \phi & -\cos \phi \cos \theta & \cos \phi \cos \theta \\ \cos \phi & -\sin \phi \cos \theta & \sin \phi \sin \theta \\ 0 & \sin \theta & \cos \theta \end{pmatrix} \begin{pmatrix} x' \\ y' \\ z' \end{pmatrix}.$$

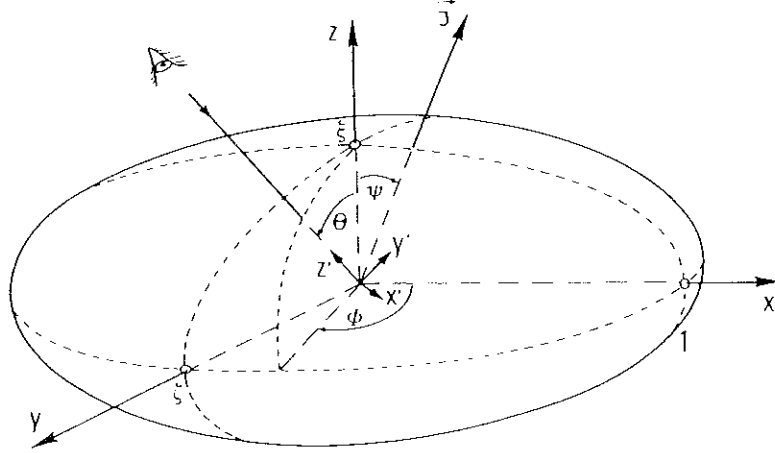


Figure 1. Coordinate system used for the projection. z' -axis is directed to the observer and is determined by polar coordinates ϕ and θ .

Then the projected along line-of-sight surface density is (Stark 1977, Binney 1985)

$$\Sigma(x', y') = \int_{-\infty}^{\infty} l(a_v^2) dz' = \frac{2}{\sqrt{f}} \int_0^{\infty} l(z''^2 + a_*^2) dz'', \quad (1.3)$$

where

$$z'' = \sqrt{f} \left(z' + \frac{g}{2f} \right) \quad a_*^2 = h - \frac{g^2}{4f} \quad (1.4)$$

$$\begin{aligned} f &= \sin^2 \theta \left(\cos^2 \phi + \frac{\sin^2 \phi}{\zeta^2} \right) + \frac{\cos^2 \theta}{\xi^2} \\ g &= \sin \theta \sin 2\phi \left(\frac{1}{\zeta^2} - 1 \right) x' + \sin 2\theta \left(\frac{1}{\xi^2} - \cos^2 \phi - \frac{\sin^2 \phi}{\zeta^2} \right) y' \\ h &= \left(\sin^2 \phi + \frac{\cos^2 \phi}{\zeta^2} \right) x'^2 + \sin 2\phi \cos \theta \left(1 - \frac{1}{\zeta^2} \right) x' y' + \\ &\quad + \left[\cos^2 \theta \left(\cos^2 \phi + \frac{\sin^2 \phi}{\zeta^2} \right) + \frac{\sin^2 \theta}{\xi^2} \right] y'^2 \end{aligned} \quad (1.5)$$

The light distribution (1.1) turns out to be:

$$\begin{aligned} \Sigma(x', y') &= \frac{2L_o}{\sqrt{f}} \int_0^{\infty} (z''^2 + a_*^2 + r_o^2)^{-3/2} dz'' = \\ &= \frac{2L_o}{\sqrt{f(a_*^2 + r_o^2)}} = \frac{2L_o}{\sqrt{f \left(h - \frac{g^2}{4f} + r_o^2 \right)}}, \end{aligned} \quad (1.6)$$

where f, h, g are given by Eq. (1.5).

In order to calculate the projected velocity field we need to introduce an additional parameter, i.e. the angle ψ between the intrinsic angular momentum and the z -axis.

If stellar velocity streamlines have the same triaxial symmetry as the isophotes (de Zeeuw 1985), then for a galaxy without figure rotation the intrinsic velocity field can be written in the form

$$\vec{u}(\vec{r}) = \frac{-2v_o}{(a_v^2 + r_o^2)^{1/2}} \left(\frac{y}{\zeta^2} \cos \psi; \frac{z}{\xi^2} \sin \psi - x \cos \psi; -\frac{y}{\zeta^2} \sin \psi \right), \quad (1.7)$$

where the same notation as in Binney (1985) is adopted.

The line-of-sight velocity at a point (x', y') on the plane of the sky is

$$v(x', y') = \frac{1}{\Sigma} \int_{-\infty}^{\infty} l \vec{u} \cdot \vec{z}' dz', \quad (1.8)$$

where the unit vector $\hat{z}'$ is given by Fig. 1 or by the rotation matrix

$$\hat{z}' = \begin{pmatrix} \cos \phi \sin \theta \\ \sin \phi \sin \theta \\ \cos \theta \end{pmatrix}. \quad (1.9)$$

At first we have to calculate $(\vec{u} \cdot \hat{z}')$ in Eq.(1.8), where $\vec{u}$ is given by (1.7) and $\hat{z}'$ by (1.9).

$$\begin{aligned} \vec{u} \cdot \hat{z}' &\sim \left(\frac{y}{\zeta^2} \cos \psi; \frac{z}{\zeta^2} \sin \psi - x \cos \psi; -\frac{y}{\zeta^2} \sin \psi \right) \cdot \begin{pmatrix} \cos \phi \sin \theta \\ \sin \phi \sin \theta \\ \cos \theta \end{pmatrix} = \\ &= \cos \phi \sin \theta \frac{\cos \psi}{\zeta^2} (x' \cos \phi - y' \sin \phi \cos \theta + z' \sin \phi \sin \theta) + \\ &+ \sin \phi \sin \theta \left[\frac{\sin \psi}{\zeta^2} (y' \sin \theta + z' \cos \theta) - \cos \psi (-x' \sin \phi - y' \cos \phi \cos \theta + z' \cos \phi \sin \theta) \right] - \\ &- \cos \theta \frac{\sin \psi}{\zeta^2} (x' \cos \phi - y' \sin \phi \cos \theta + z' \sin \phi \cos \theta) = \\ &= \cos \phi \sin \theta \frac{\cos \psi}{\zeta^2} (x' \cos \phi - y' \sin \phi \cos \theta) - \cos \theta \frac{\sin \psi}{\zeta^2} (x' \cos \phi - y' \sin \phi \cos \theta) + \\ &+ \sin \phi \sin \theta \left(\frac{\sin \psi}{\zeta^2} y' \sin \theta + x' \sin \phi \cos \psi + y' \cos \psi \cos \phi \cos \theta \right) + \\ &+ \frac{1}{2} \left(\sin 2\phi \sin^2 \theta \frac{\cos \psi}{\zeta^2} + \sin 2\theta \sin \phi \frac{\sin \psi}{\zeta^2} - \sin 2\phi \sin^2 \theta \cos \psi - \sin 2\theta \sin \phi \frac{\sin \psi}{\zeta^2} \right) z'. \end{aligned}$$

Therefore,

$$\vec{u} \cdot \hat{z}' \sim P(x', y') + Qz', \quad (1.10)$$

where

$$\begin{aligned} P(x', y') &= x' \left[\sin \theta \cos \psi \left(\frac{\cos^2 \phi}{\zeta^2} + \sin^2 \phi \right) - \cos \theta \sin \psi \frac{\cos \phi}{\zeta^2} \right] + \\ &+ y' \left[\frac{1}{4} \sin 2\phi \sin 2\theta \cos \psi \left(1 - \frac{1}{\zeta^2} \right) + \sin \phi \sin \psi \left(\frac{\sin^2 \theta}{\zeta^2} + \frac{\cos^2 \theta}{\zeta^2} \right) \right] \\ Q &= \frac{1}{2} \sin 2\phi \sin^2 \theta \cos \psi \left(\frac{1}{\zeta^2} - 1 \right) + \frac{1}{2} \sin 2\theta \sin \phi \sin \psi \left(\frac{1}{\xi^2} - \frac{1}{\zeta^2} \right). \end{aligned} \quad (1.11)$$

Taking into account Eq. (1.7) and (1.10), for the line-of-sight velocity (1.8) we derive

$$v(x', y') = \frac{-2L_o v_o}{\Sigma} \int_{-\infty}^{\infty} \frac{P(x', y') + Qz'}{(a_o^2 + r_o^2)^2} dz'.$$

This integral can be processed in the same way shown in Binney (1985). It is however important to stress that our $P(x', y')$ and Q are different from those derived by Binney. The result is

$$v(x', y') = \frac{-L_o v_o \pi}{\Sigma \sqrt{f}} \frac{\left(P - \frac{Qg}{2f}\right)}{(a_*^2 + r_o^2)^{3/2}}.$$

And, by using Eq. (1.6) we obtain

$$v(x', y') = \frac{-v_o \pi}{2} \frac{\left(P - \frac{Qg}{2f}\right)}{(a_*^2 + r_o^2)^{1/2}}, \quad (2.8)$$

where P and Q are given by Eq. (1.11) and a_*, g, f by Eqs. (1.4–5).

3. Description of the Atlas

In the Atlas we present the observable kinematical properties of the triaxial elliptical galaxies. For each set of initial data two figures are given. The upper one is the velocity field and the configuration of the galaxy, while the lower one gives the minor and major axis rotation curves. Ellipsoids drawn by continuous line mark the apparent stellar isophote contour of the galaxy (as stated before, in our models equidensity surfaces are similar ellipsoids). Ellipses marked by open squares give the shape of the projected gas (and/or dust) disk. In the case of nearly minor axis dust lanes the gas (dust) disks must lay always on the yz -plane, i.e. perpendicular to the longest axis of the triaxial figure (although we made the calculations also for disks perpendicular to the shortest axis). The velocity field is drawn with equal velocity step for all figures. The smaller number of isovelocity contours in a figure means therefore, that the maximum rotation velocity is smaller. To help understanding the radial scale in the figures, we expressed them in units of $\zeta r_o = 5''$. This corresponds to the typical light profile of a bright galaxy ($M_B \sim -20$) at the redshift $V_o \sim 1500 \text{ km/s}$. This unit can however be transformed in dimensionless units by substituting $10'' = 2$.

We would like to draw the attention of the observers to the asymmetries of the velocity fields with respect of the rotational ‘major’ axis for several viewing angles and to the fact that in many cases the rotational ‘major’ and ‘minor’ axis are not perpendicular. Therefore, before reaching any conclusions about the intrinsic shape of a galaxy and about its viewing angles, it is highly recommended to obtain rotation curves at several position angles and from offcentered positions.

In the lower figures (rotation curves) filled triangles give the expected velocities along the apparent major axis, while open triangles correspond to the minor axis. Figures are plotted with a cutoff at $v/v_o = 1.5$ (notice that v_o is not a maximum rotation velocity, but simply a normalization parameter).

In order to minimize the number of figures in the Atlas we adopted reasonably large steps in both the intrinsic axial ratios ξ and ζ and in the kinematic misalignment ψ . In most cases plots are presented for $\psi = 0^\circ, 8^\circ, 15^\circ, 45^\circ$, and 90° . The intrinsic shape of the galaxies was assumed to be maximally triaxial, i.e. the length of the intermediate axis y is the exact average of the shortest and the longest axis in accordance with the statistics made by Binney (1985). Such configurations lay also in the region of most probable triaxialities given by Franx et al. (1991). The smallest axial ratio ξ changes with the step 0.1 from 0.4 to 0.9 (as in fact there are no ellipticals with Hubble type later than E6).

The Atlas is planned for observers and is organized accordingly. Plots are ordered by the observed ellipticity of the galaxy i.e. the Hubble type. To economy the space only galaxies up to E4 were included (embracing in fact $\sim 90\%$ from the total number of galaxies). Inside each type, plots are ordered according to the apparent flatness of the gas (dust) disk. Viewing angles θ and ϕ are sampled from 0° to 90° and from 0° to 180° . Additional orientations can be obtained from symmetry considerations: $\theta' \rightarrow 180^\circ - \theta$ and $\phi' \rightarrow \phi + 180^\circ$

In order to allow a direct estimate of the uncertainties in the viewing angles ϕ and θ originating from the possible errors in the galactic apparent ellipticity and/or in the apparent flatness of the gas/dust disk, we added the Figs. 2 and 3. These figures give the dependence on the viewing angle of the apparent axial ratios of the stellar isophotes and gas disks respectively. Taking some particular error in axial ratios we can estimate from the figures the corresponding uncertainty in the viewing angles.

4. Contents of the Atlas

1. E0-1 galaxies	3
a) $\epsilon_{gas} = 0.1$	4
b) $\epsilon_{gas} = 0.3$	6
c) $\epsilon_{gas} = 0.5$	8

2. E1 galaxies	13
a) $\epsilon_{gas} = 0.0$	14
b) $\epsilon_{gas} = 0.1$	15
c) $\epsilon_{gas} = 0.3$	18
d) $\epsilon_{gas} = 0.5$	21
3. E2 galaxies	27
a) $\epsilon_{gas} = 0.0$	28
b) $\epsilon_{gas} = 0.1$	29
c) $\epsilon_{gas} = 0.3$	34
d) $\epsilon_{gas} = 0.5$	39
4. E3 galaxies	47
a) $\epsilon_{gas} = 0.0$	48
b) $\epsilon_{gas} = 0.1$	49
c) $\epsilon_{gas} = 0.3$	57
d) $\epsilon_{gas} = 0.5$	65
5. E4 galaxies	73
a) $\epsilon_{gas} = 0.0$	74
b) $\epsilon_{gas} = 0.1$	75
c) $\epsilon_{gas} = 0.3$	80
d) $\epsilon_{gas} = 0.5$	85

References

- Bender R., 1988. *Astron. Astrophys.* **193**, L7
- Bertola F., 1987. In T. de Zeeuw (Ed.) *Structure and Dynamics of Elliptical Galaxies*, IAU Symposium No. 127. Dordrecht: Reidel, p. 135

- Bertola F., Capaccioli M., 1975. *Astrophys. J.* **200**, 439
- Binney J., 1978. *Mon. Notices Roy. Astron. Soc.* **183**, 779
- Binney J., 1985. *Mon. Notices Roy. Astron. Soc.* **212**, 767
- Binney J., Tremaine S., 1987. *Galactic Dynamics* Princeton: Princeton University Press
- Busarello G., Longo G., Feoli A., 1992. *Astron. Astrophys.* in press
- Contopoulos G., 1956. *Zeitschr. für Astroph.* **39**, 126
- Davies R.L., Efstathiou G., Fall S.M., Illingworth G., Schechter P.L., 1983. *Astrophys. J.* **266**, 41
- Demoulin-Ulrich M.-H., Butcher H.R., Bokkenberg A., 1984. *Astrophys. J.* **285**, 527
- de Zeeuw T., 1985. *Mon. Notices Roy. Astron. Soc.* **216**, 273
- de Zeeuw P.T., Peletier R.F., Franx M., 1986. *Mon. Notic. Roy. Astron. Soc.* **221**, 1001
- Franx M., Illingworth G., de Zeeuw T., 1991. *Astrophys. J.* **383**,
- Gunn J.E., 1987. In C. Hazard, S. Mitton (Eds.) *Active Galactic Nuclei*, Cambridge: Cambridge University Press, p. 213
- Habe A., Ikeuchi S., 1985. *Astrophys. J.* **289**, 540
- Habe A., Ikeuchi S., 1988. *Astrophys. J.* **326**, 84
- Illingworth G., 1977. *Astrophys. J.* **218**, L43
- Rybicki G.B., 1987. In T. de Zeeuw (Ed.) *Structure and Dynamics of Elliptical Galaxies*, IAU Symposium No. 127. Dordrecht: Reidel, p. 397
- Stark A.A., 1977. *Astrophys. J.* **213**, 368

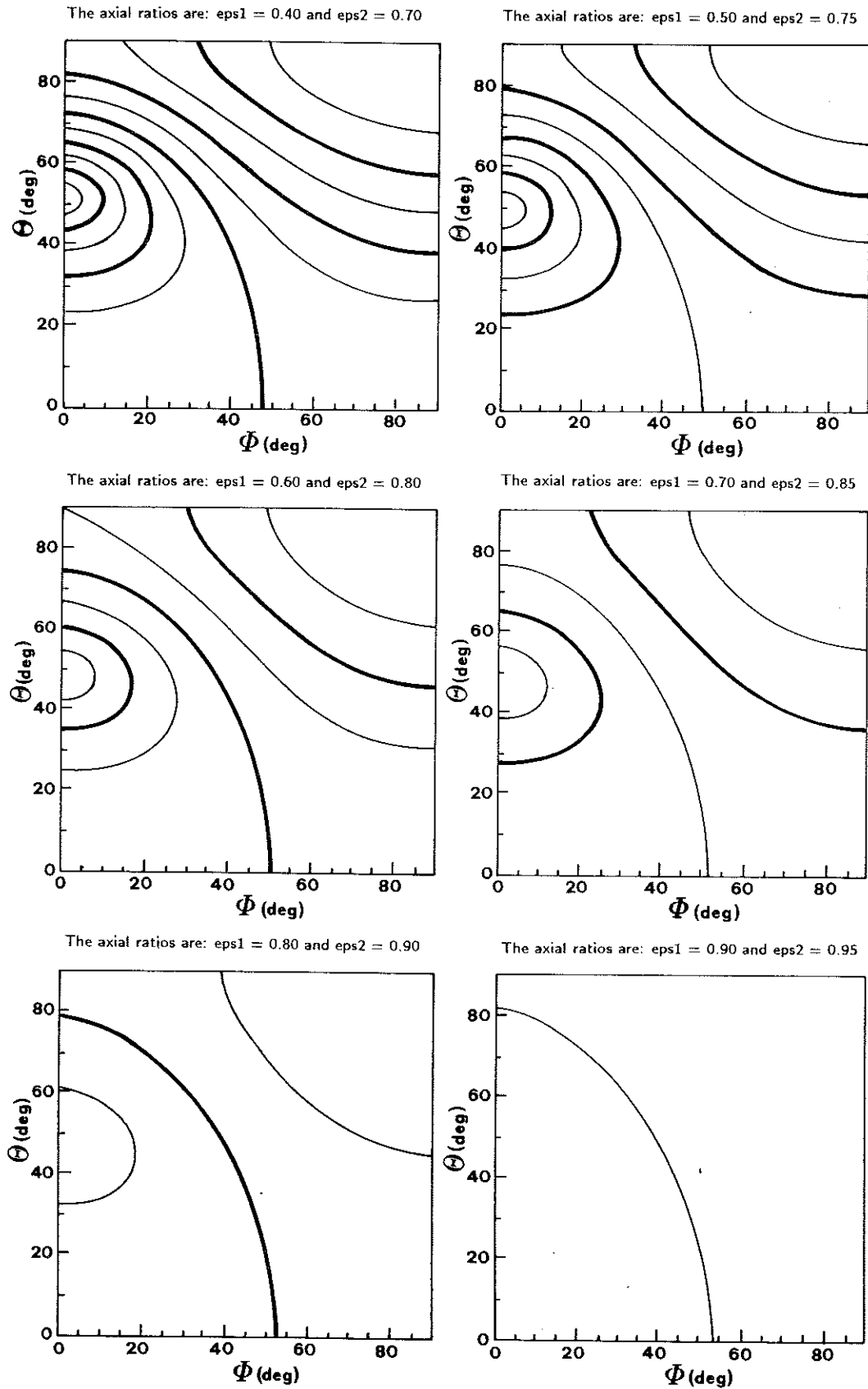


Figure 2. The isocontours of the apparent axial ratios of light distribution. The innermost contour has $\epsilon = 0.95$, the step is 0.05.

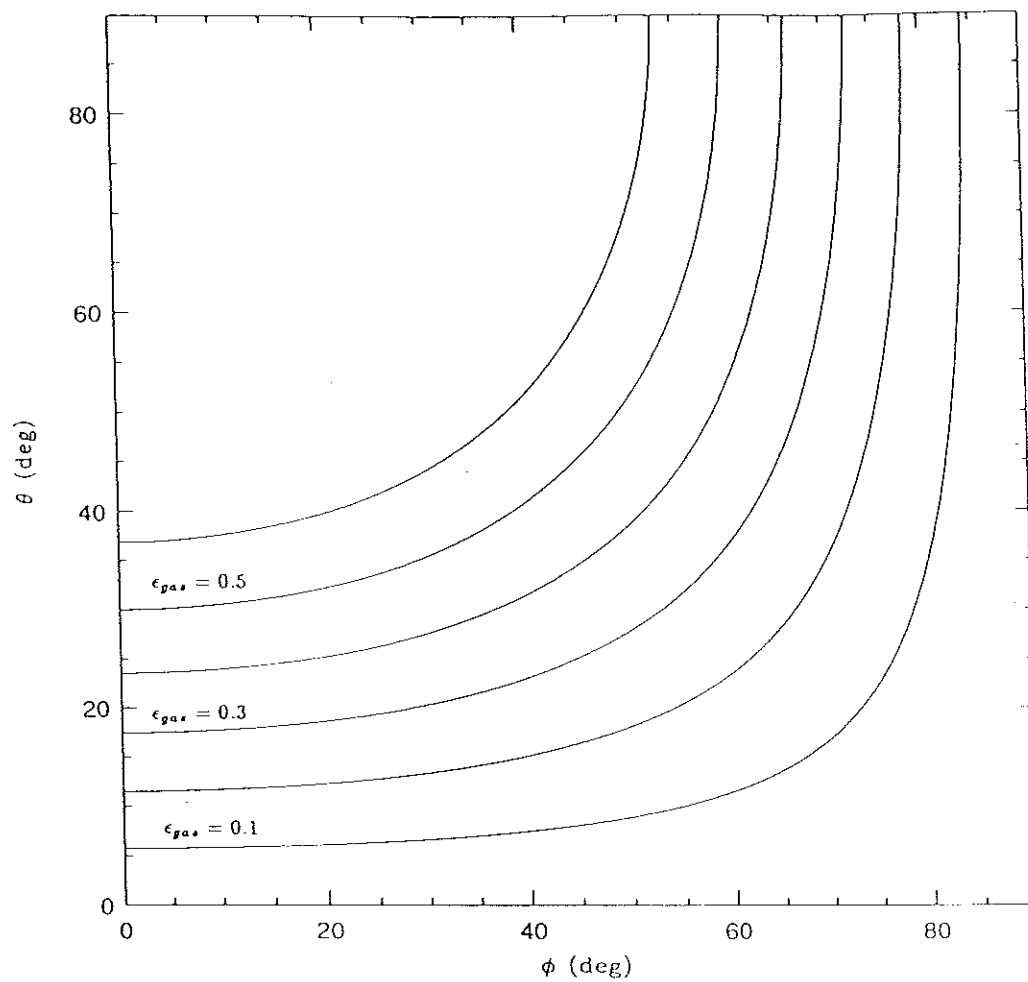
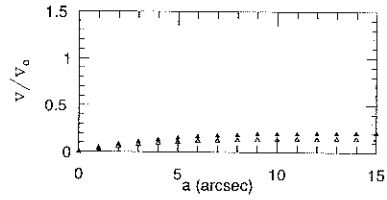
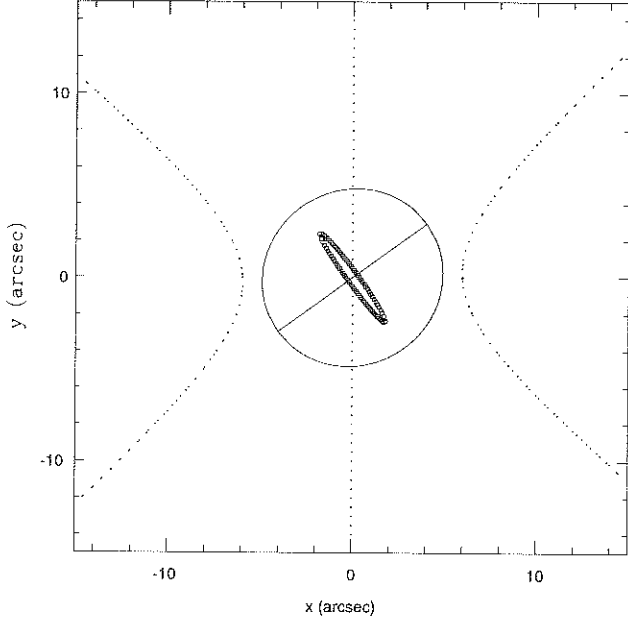


Figure 3. The isocontours of the apparent axial ratios of the gas (dust) disk.

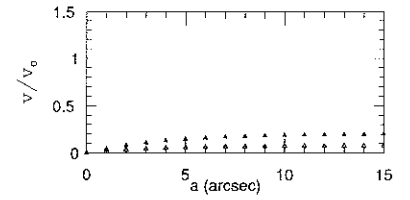
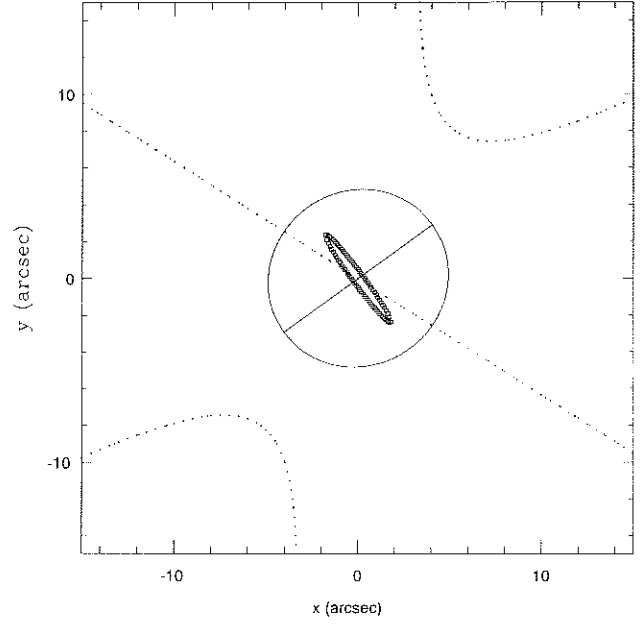
ATLAS OF VELOCITY FIELDS

E0—1 GALAXIES

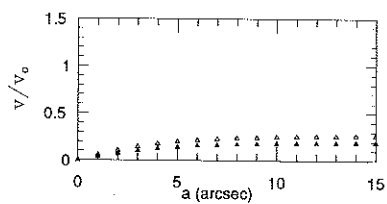
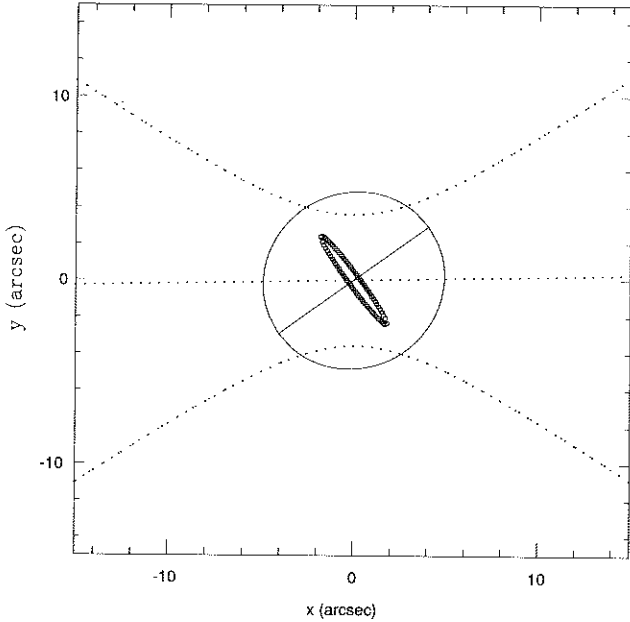
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 53.0$, $\theta = 9.5$
 Apparent axial ratio = 0.95, $\rho_a = 54.1$, kinematic misalignment = 0.0



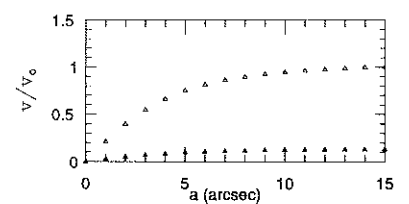
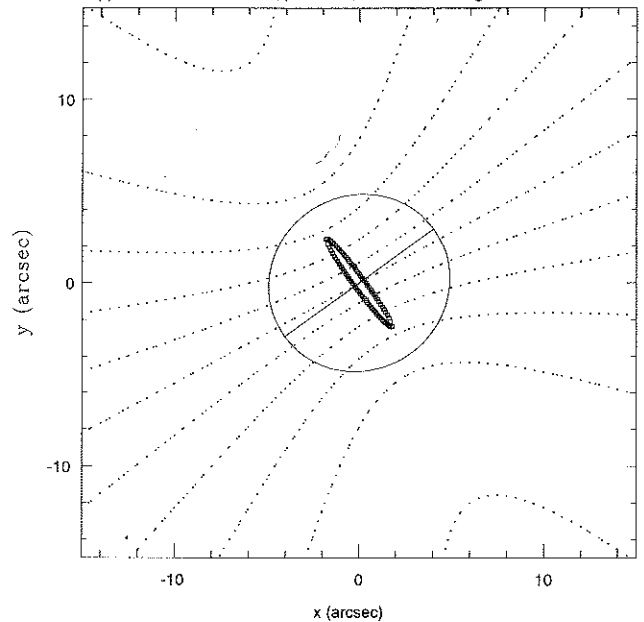
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 53.0$, $\theta = 9.5$
 Apparent axial ratio = 0.95, $\rho_a = 54.1$, kinematic misalignment = 8.0



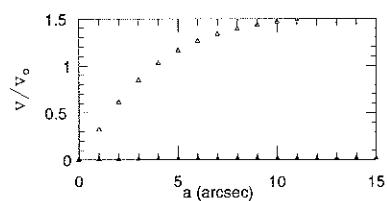
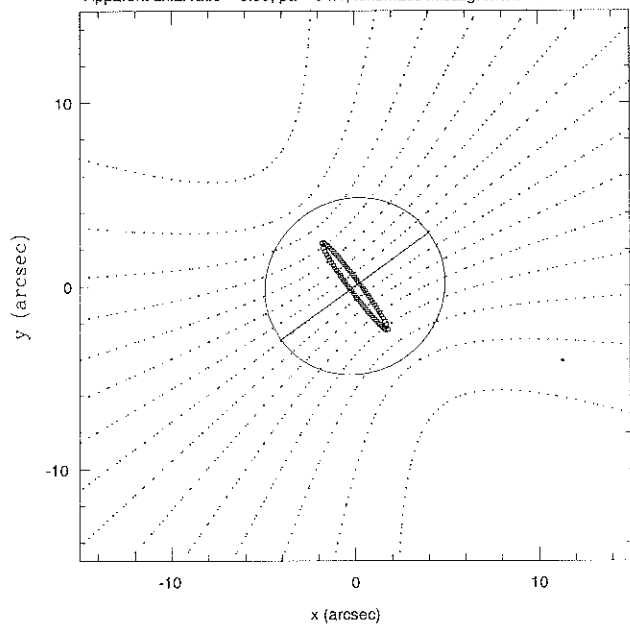
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 53.0$, $\theta = 9.5$
 Apparent axial ratio = 0.95, $\rho_a = 54.1$, kinematic misalignment = 15.0



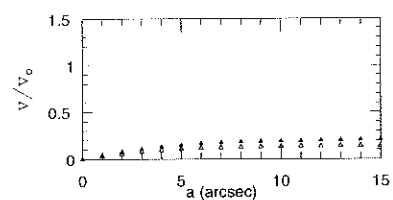
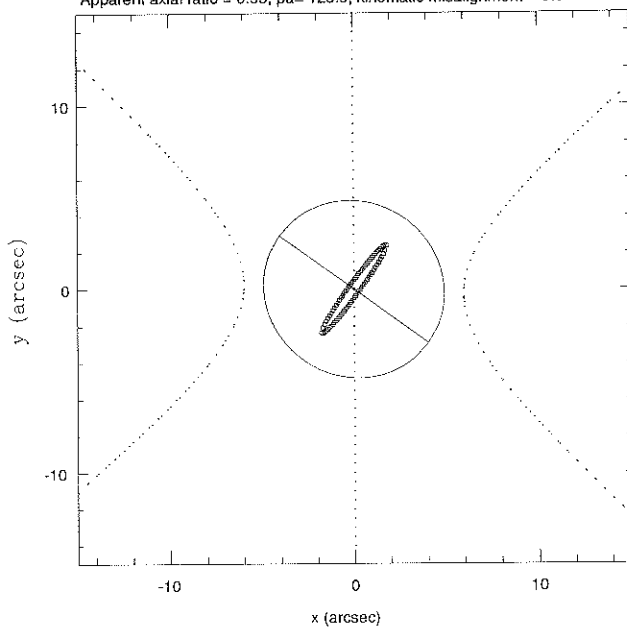
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 53.0$, $\theta = 9.5$
 Apparent axial ratio = 0.95, $\rho_a = 54.1$, kinematic misalignment = 45.0



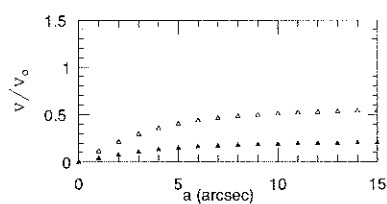
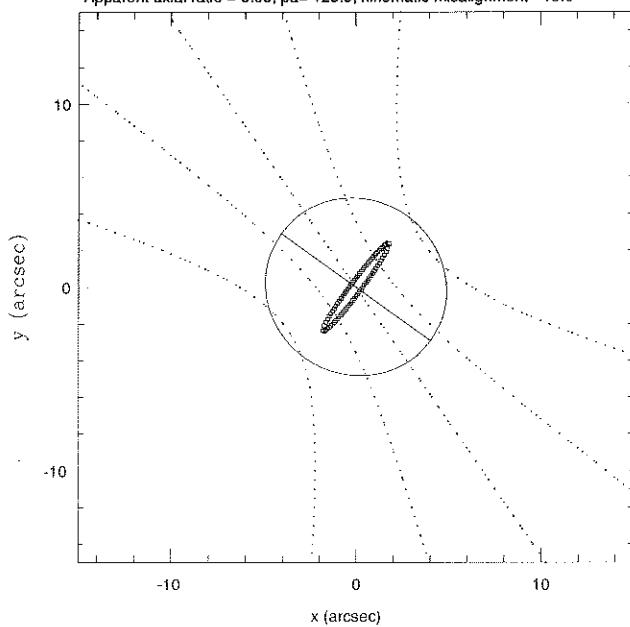
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi= 53.0$, $\theta= 9.5$
 Apparent axial ratio = 0.95, $pa= 54.1$, kinematic misalignment =90.0



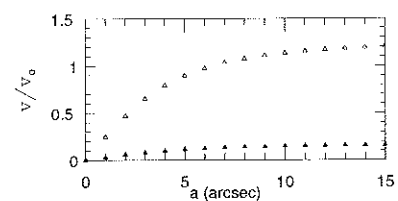
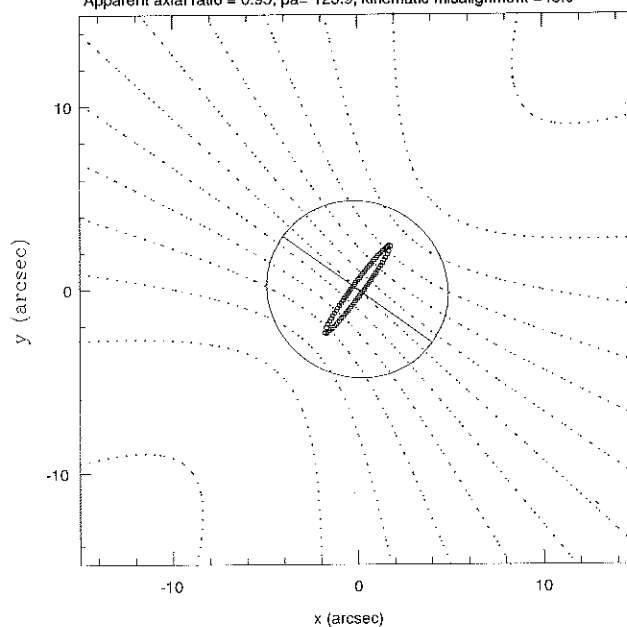
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi= 127.0$, $\theta= 9.5$
 Apparent axial ratio = 0.95, $pa= 125.9$, kinematic misalignment = 0.0



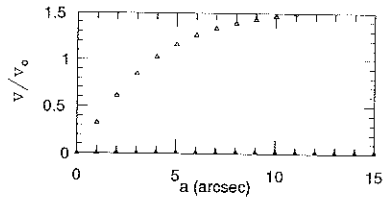
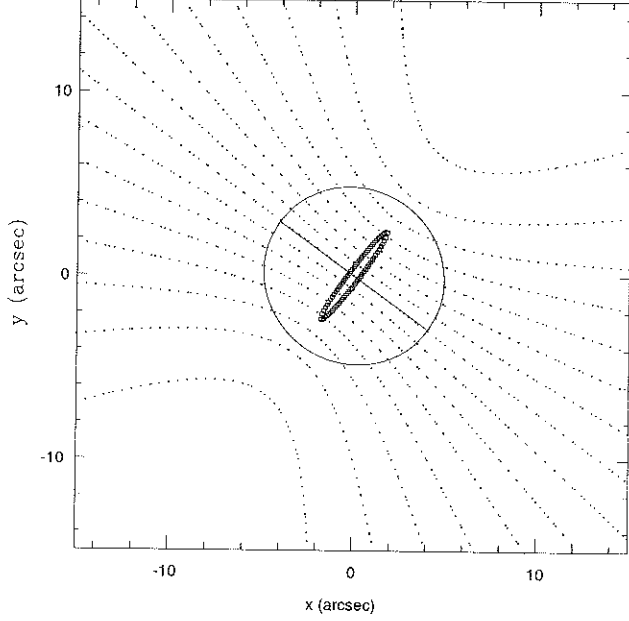
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi= 127.0$, $\theta= 9.5$
 Apparent axial ratio = 0.95, $pa= 125.9$, kinematic misalignment =15.0



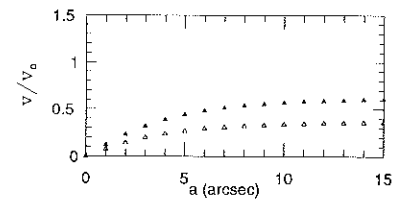
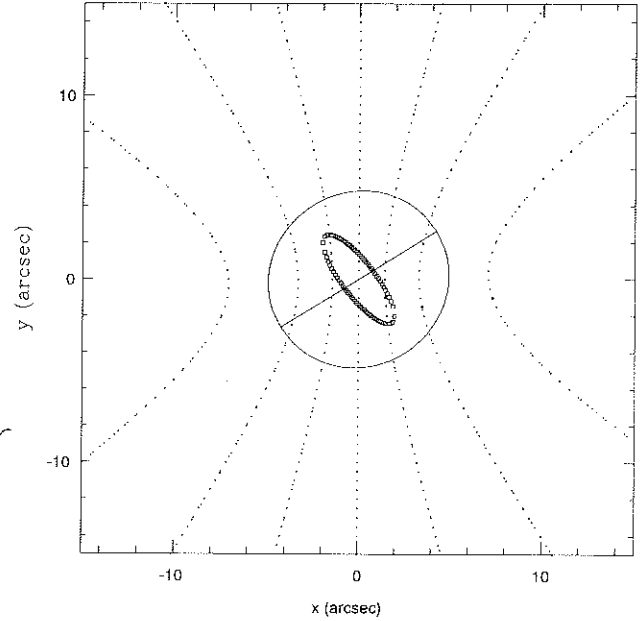
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi= 127.0$, $\theta= 9.5$
 Apparent axial ratio = 0.95, $pa= 125.9$, kinematic misalignment =45.0



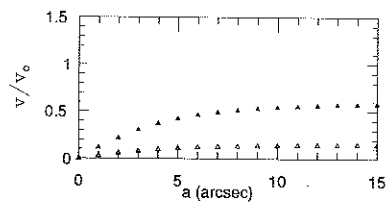
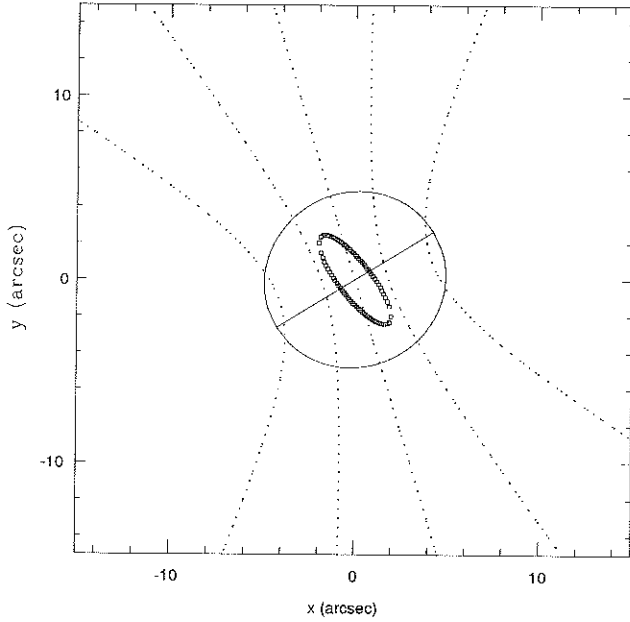
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=127.0$, $\theta=9.5$
 Apparent axial ratio = 0.95, $pa=125.9$, kinematic misalignment = 90.0



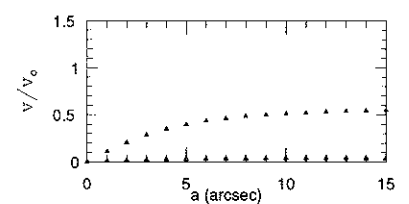
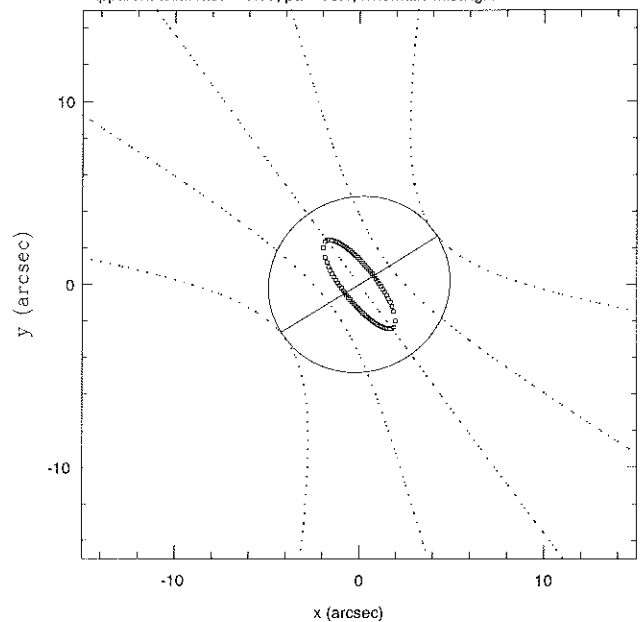
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=49.0$, $\theta=27.5$
 Apparent axial ratio = 0.95, $pa=58.1$, kinematic misalignment = 0.0



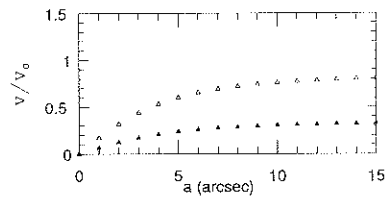
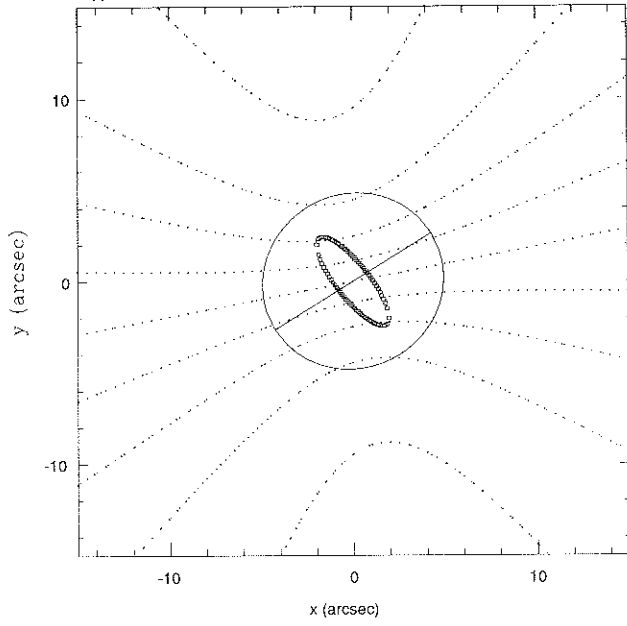
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=49.0$, $\theta=27.5$
 Apparent axial ratio = 0.95, $pa=58.1$, kinematic misalignment = 8.0



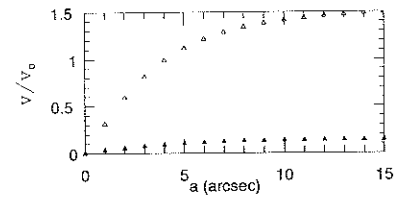
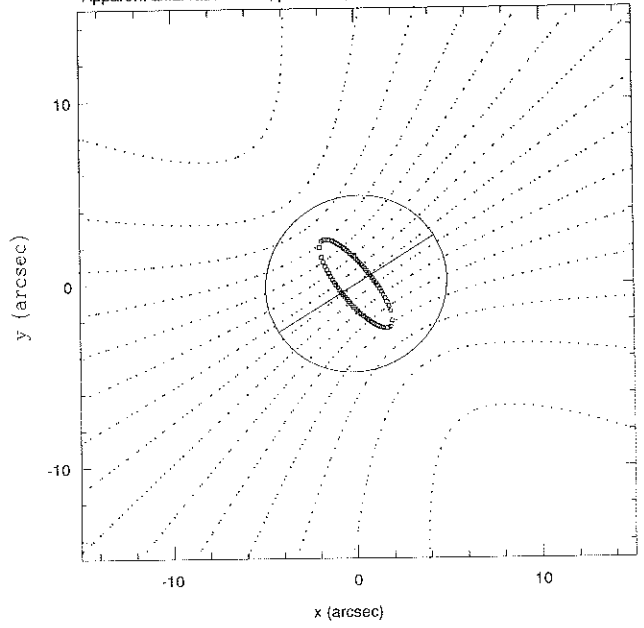
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=49.0$, $\theta=27.5$
 Apparent axial ratio = 0.95, $pa=58.1$, kinematic misalignment = 15.0



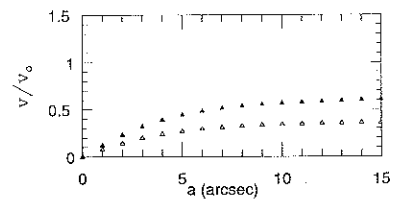
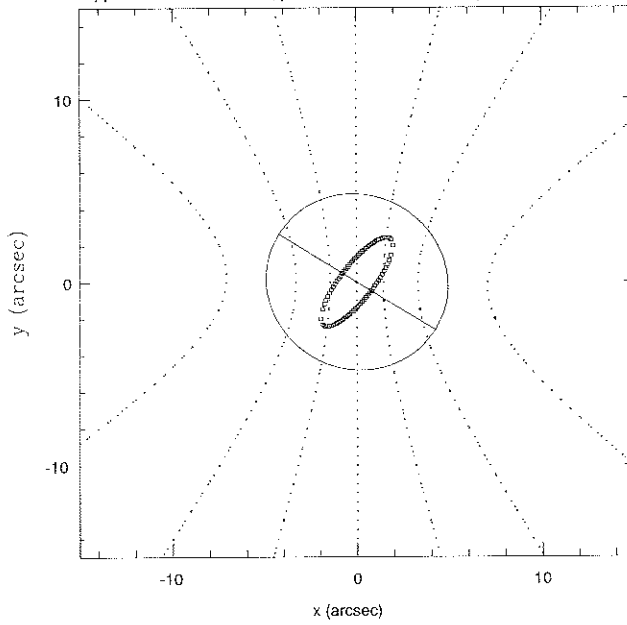
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi= 49.0$, $\theta= 27.5$
 Apparent axial ratio = 0.95, $pa= 58.1$, kinematic misalignment =45.0



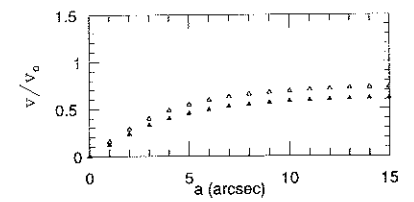
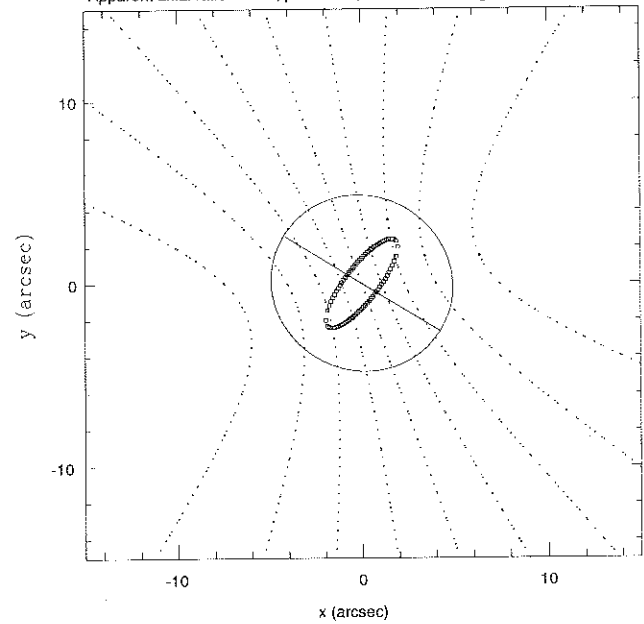
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi= 49.0$, $\theta= 27.5$
 Apparent axial ratio = 0.95, $pa= 58.1$, kinematic misalignment =90.0



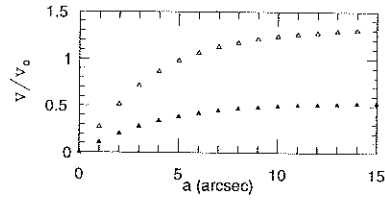
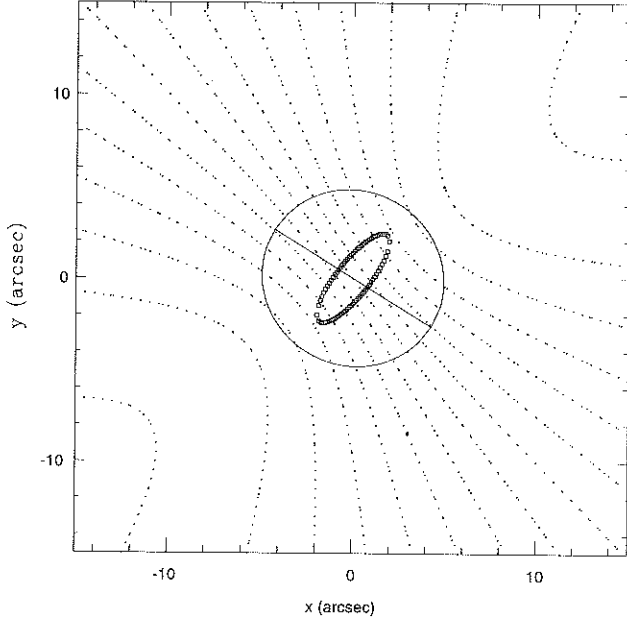
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi= 131.0$, $\theta= 27.5$
 Apparent axial ratio = 0.95, $pa= 121.9$, kinematic misalignment = 0.0



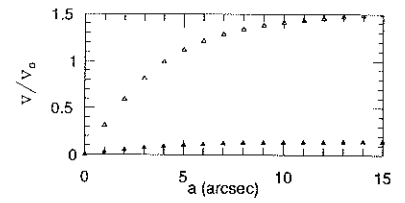
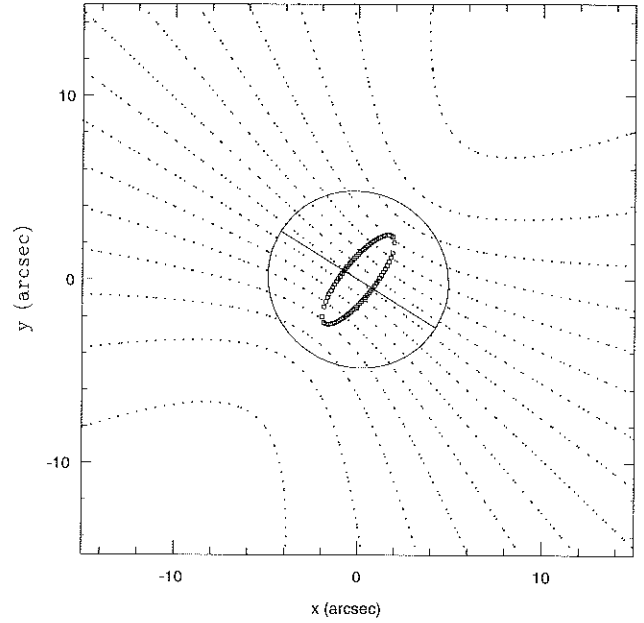
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi= 131.0$, $\theta= 27.5$
 Apparent axial ratio = 0.95, $pa= 121.9$, kinematic misalignment =15.0



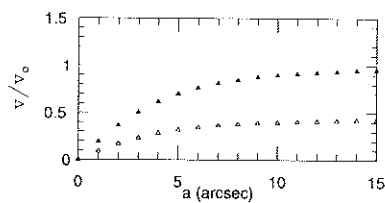
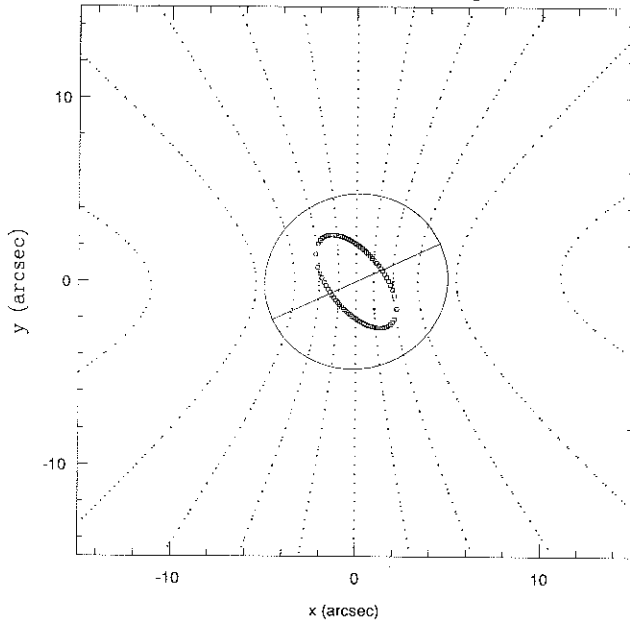
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=131.0$, $\theta=27.5$
 Apparent axial ratio = 0.95, $pa=121.9$, kinematic misalignment = 45.0



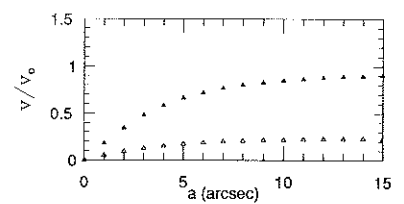
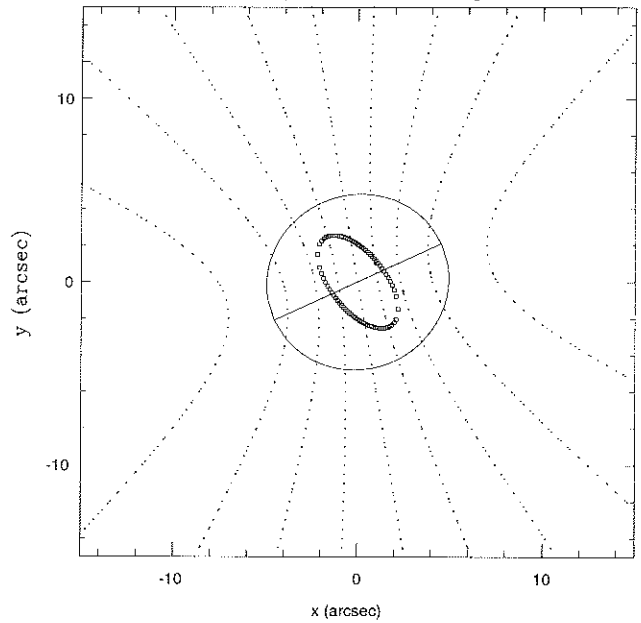
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=131.0$, $\theta=27.5$
 Apparent axial ratio = 0.95, $pa=121.9$, kinematic misalignment = 90.0



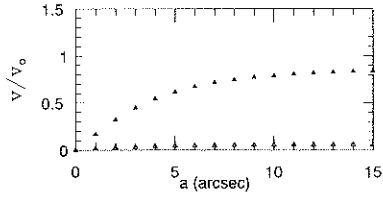
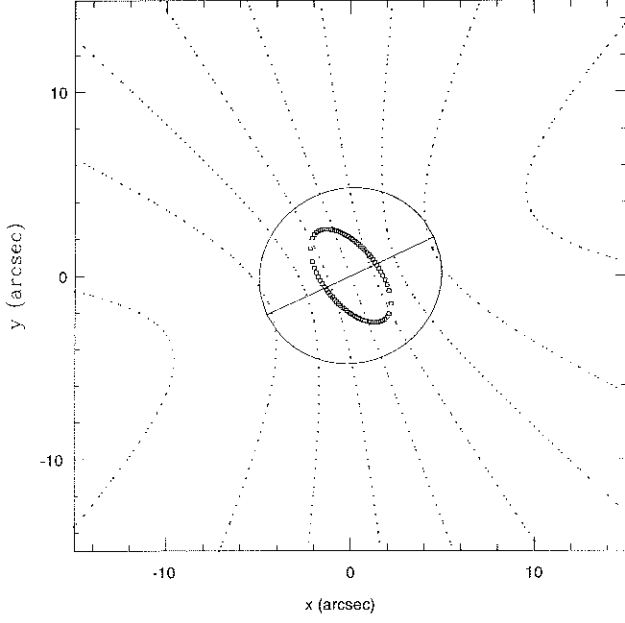
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=43.0$, $\theta=43.0$
 Apparent axial ratio = 0.95, $pa=65.2$, kinematic misalignment = 0.0



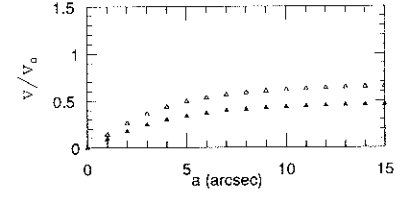
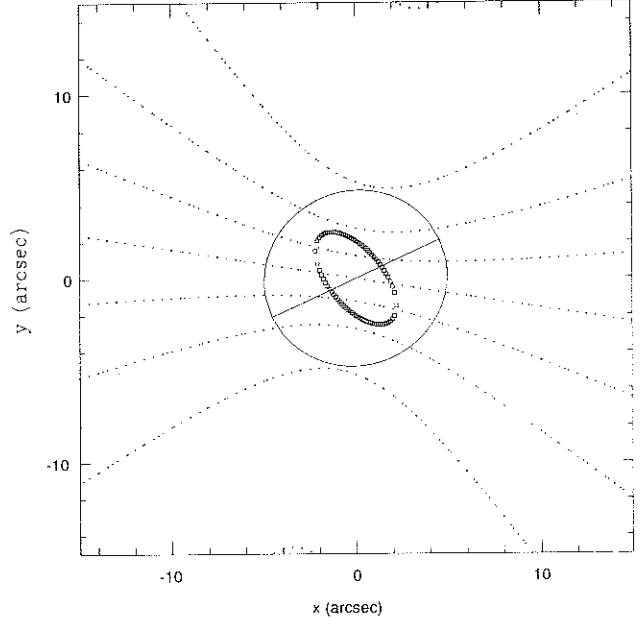
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=43.0$, $\theta=43.0$
 Apparent axial ratio = 0.95, $pa=65.2$, kinematic misalignment = 8.0



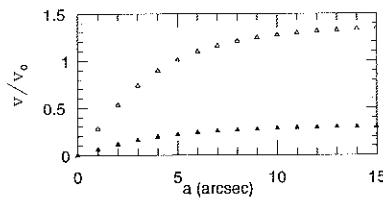
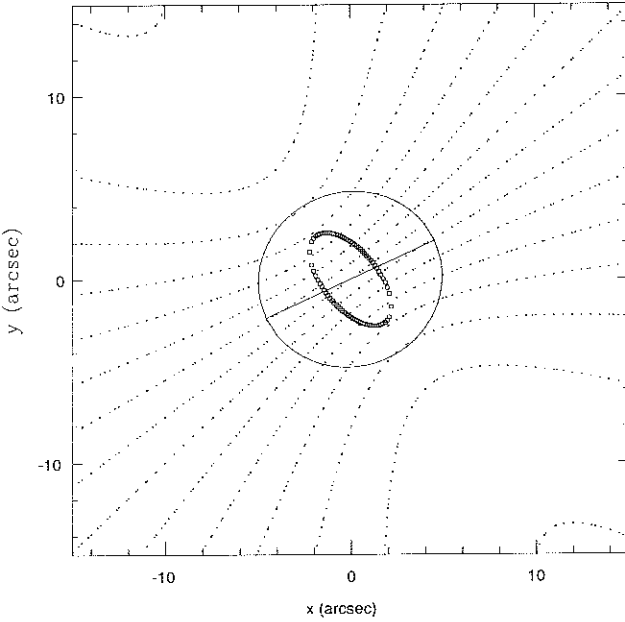
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 43.0$, $\theta = 43.0$
 Apparent axial ratio = 0.95, $pa = 65.2$, kinematic misalignment = 15.0



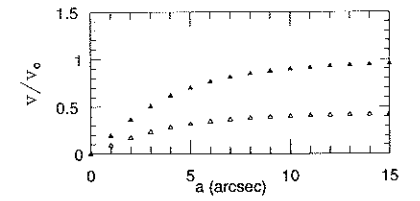
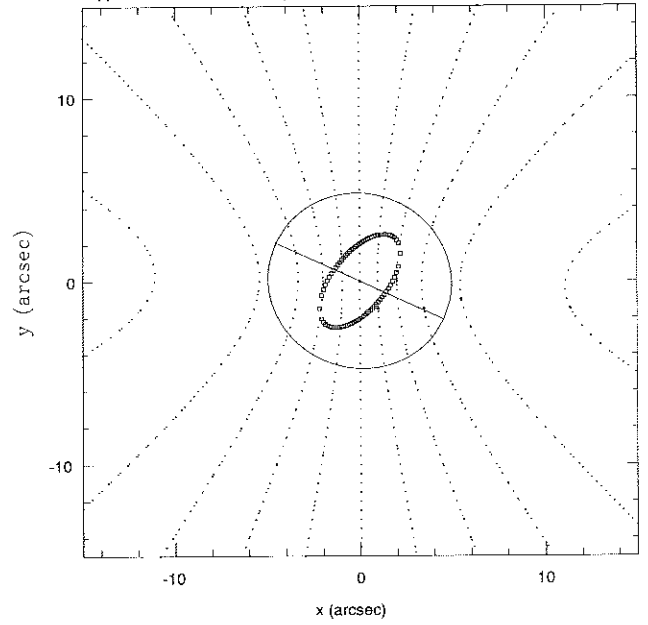
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 43.0$, $\theta = 43.0$
 Apparent axial ratio = 0.95, $pa = 65.2$, kinematic misalignment = 45.0



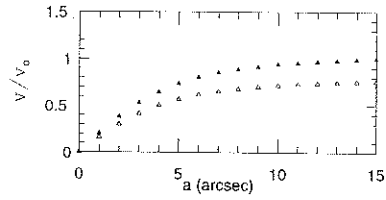
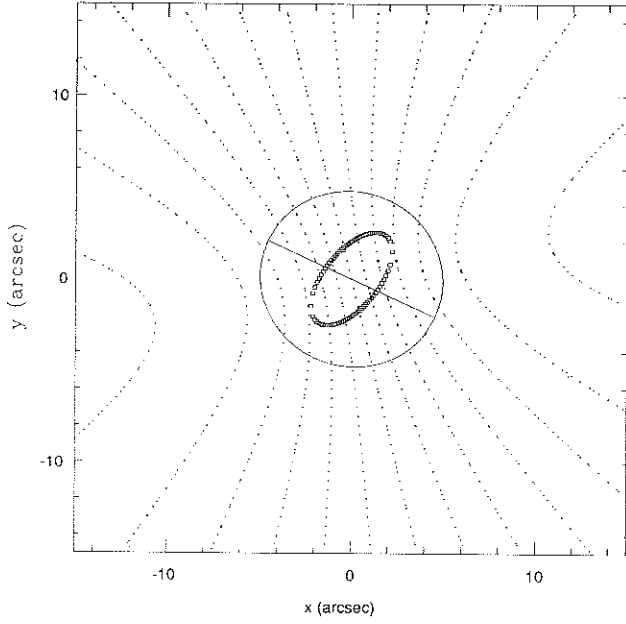
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 43.0$, $\theta = 43.0$
 Apparent axial ratio = 0.95, $pa = 65.2$, kinematic misalignment = 90.0



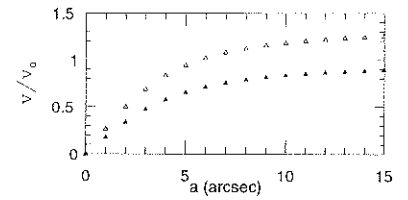
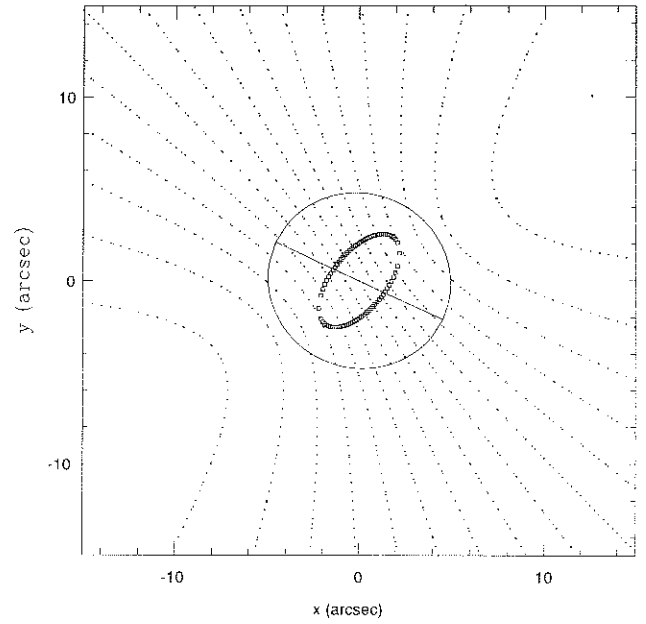
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 137.0$, $\theta = 43.0$
 Apparent axial ratio = 0.95, $pa = 114.8$, kinematic misalignment = 0.0



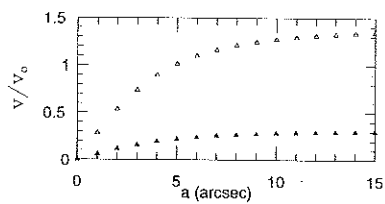
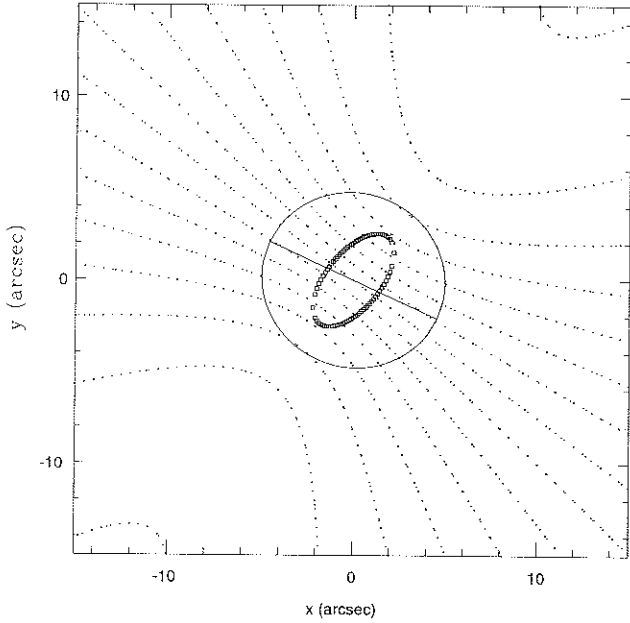
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=137.0$, $\theta=43.0$
 Apparent axial ratio = 0.95, $pa=114.8$, kinematic misalignment =15.0



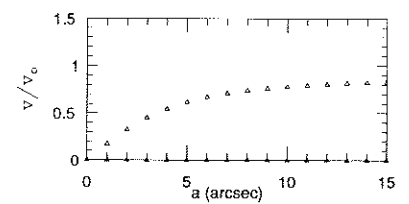
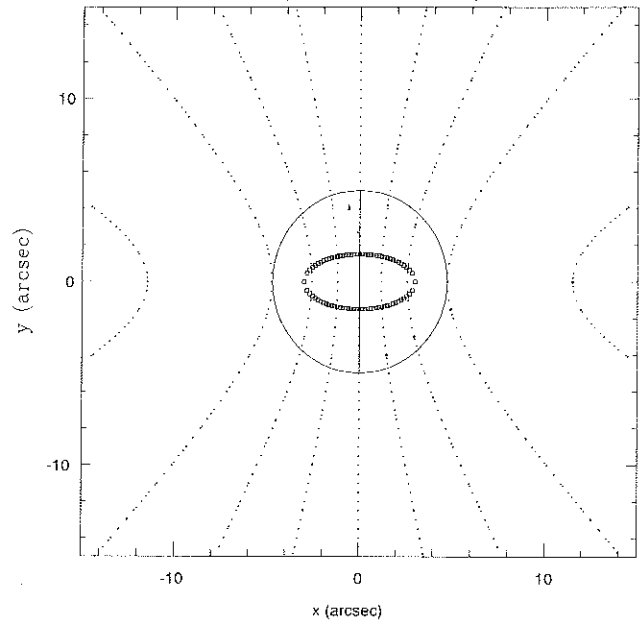
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=137.0$, $\theta=43.0$
 Apparent axial ratio = 0.95, $pa=114.8$, kinematic misalignment =45.0

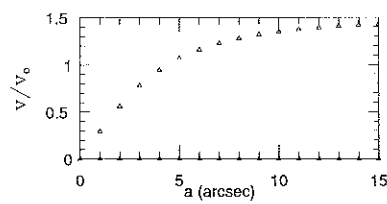
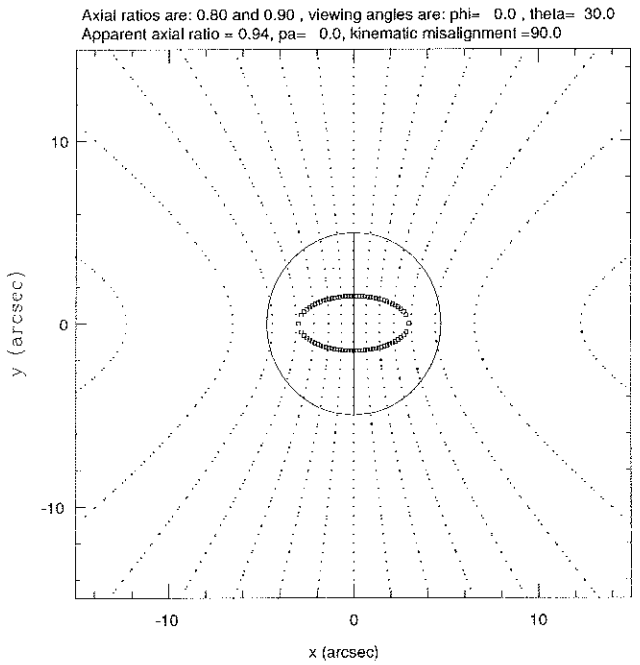
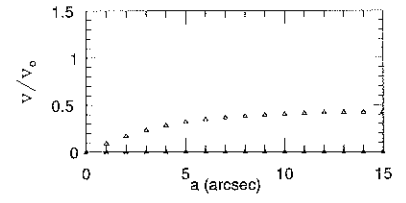
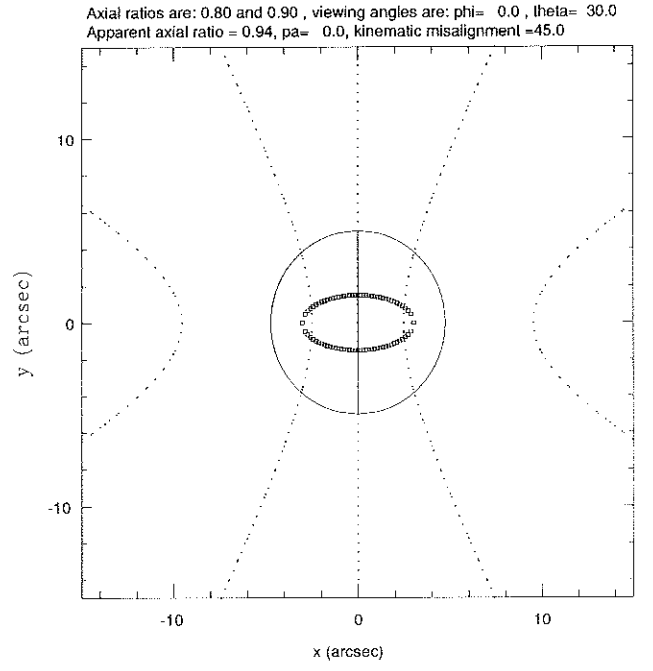
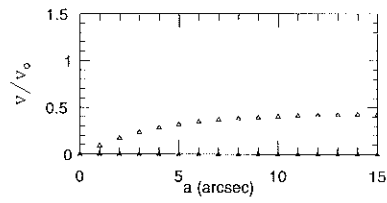
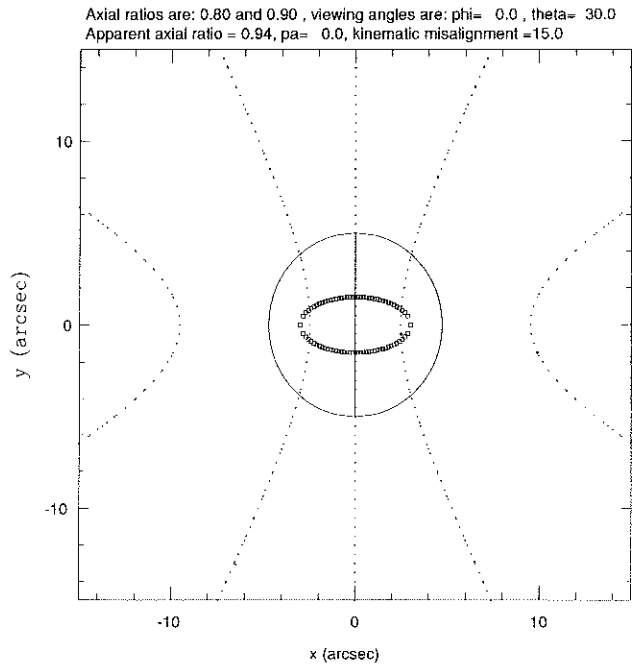


Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=137.0$, $\theta=43.0$
 Apparent axial ratio = 0.95, $pa=114.8$, kinematic misalignment =90.0



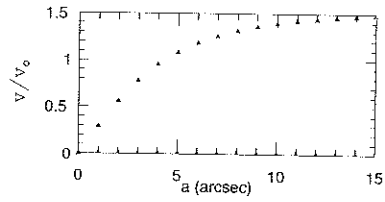
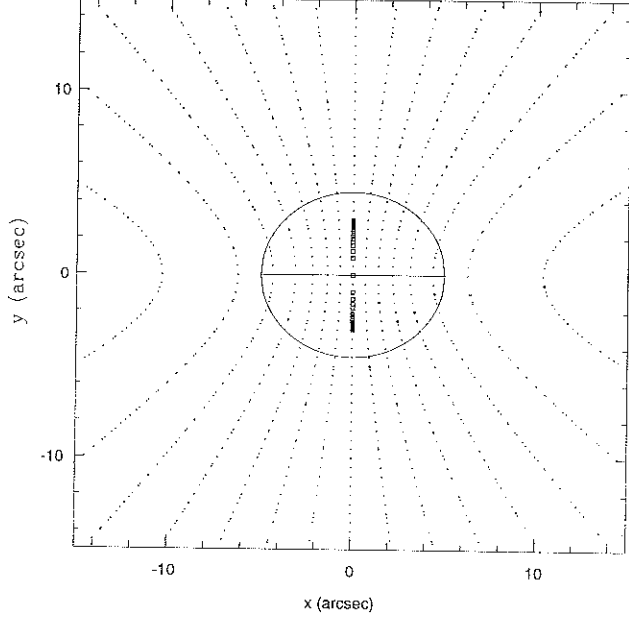
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=0.0$, $\theta=30.0$
 Apparent axial ratio = 0.94, $pa=0.0$, kinematic misalignment = 0.0



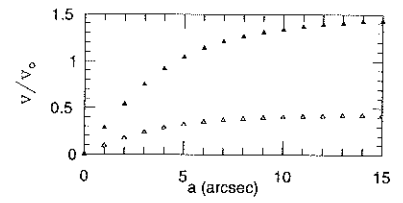
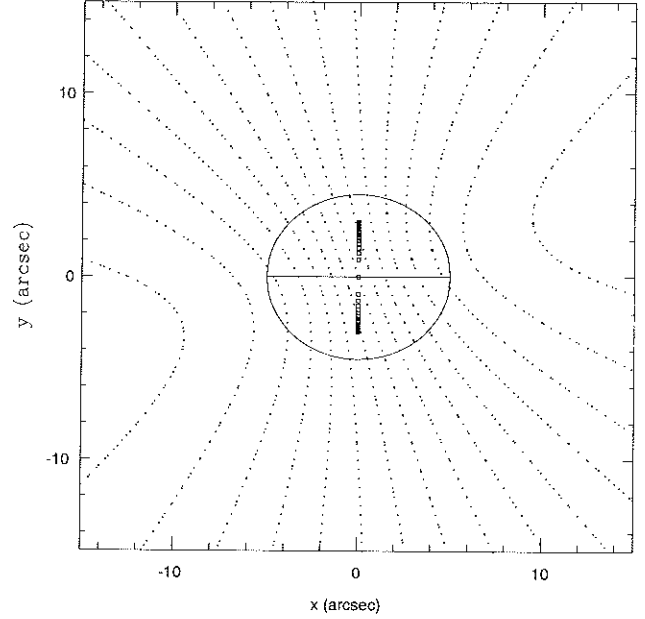


E1 GALAXIES

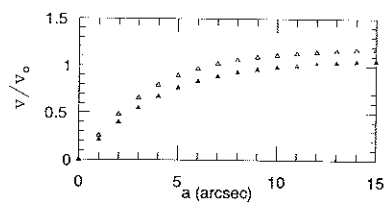
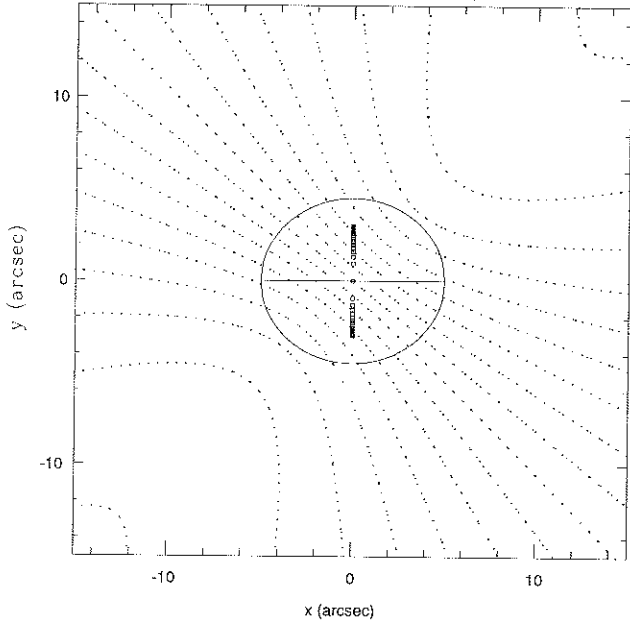
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 90.0$, $\theta = 90.0$
 Apparent axial ratio = 0.90, $\rho_a = 90.0$, kinematic misalignment = 0.0



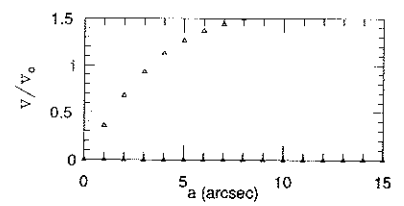
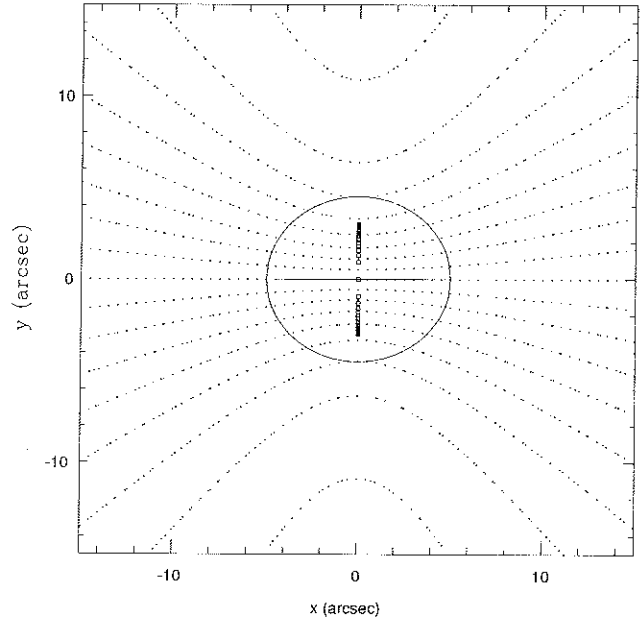
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 90.0$, $\theta = 90.0$
 Apparent axial ratio = 0.90, $\rho_a = 90.0$, kinematic misalignment = 15.0



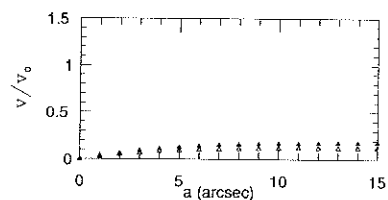
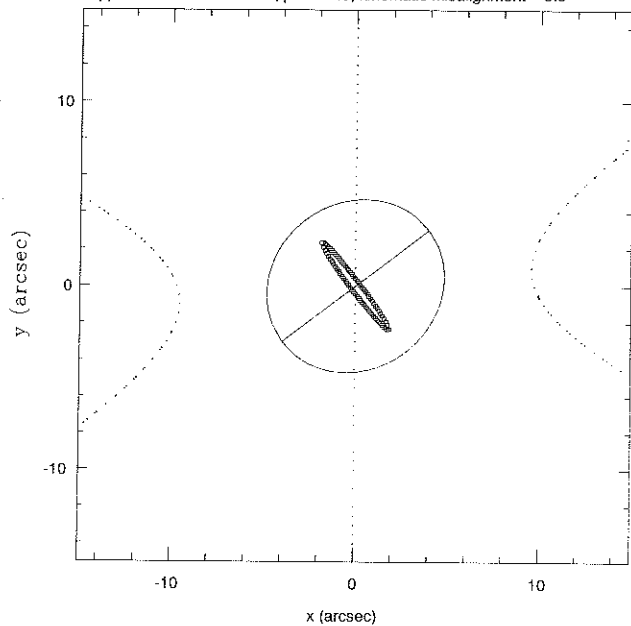
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 90.0$, $\theta = 90.0$
 Apparent axial ratio = 0.90, $\rho_a = 90.0$, kinematic misalignment = 45.0



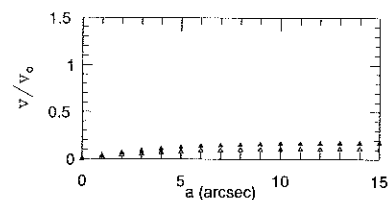
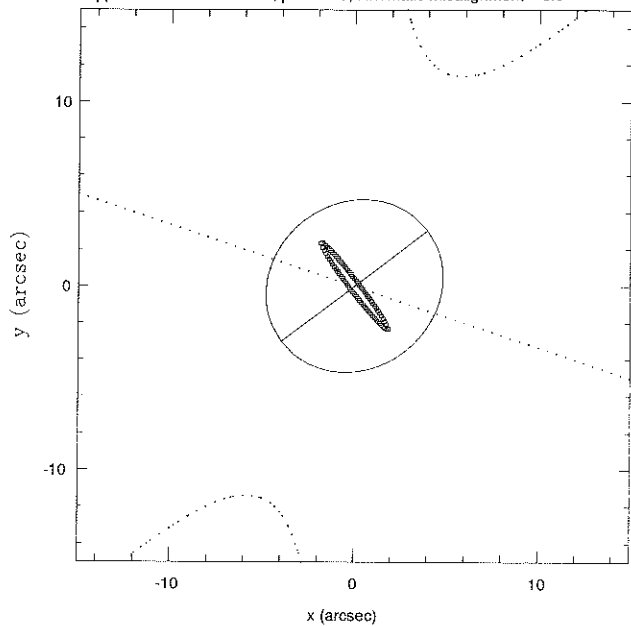
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi = 90.0$, $\theta = 90.0$
 Apparent axial ratio = 0.90, $\rho_a = 90.0$, kinematic misalignment = 90.0



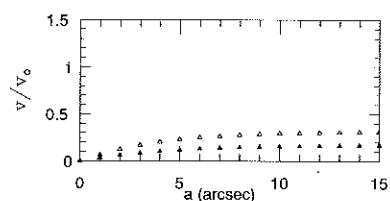
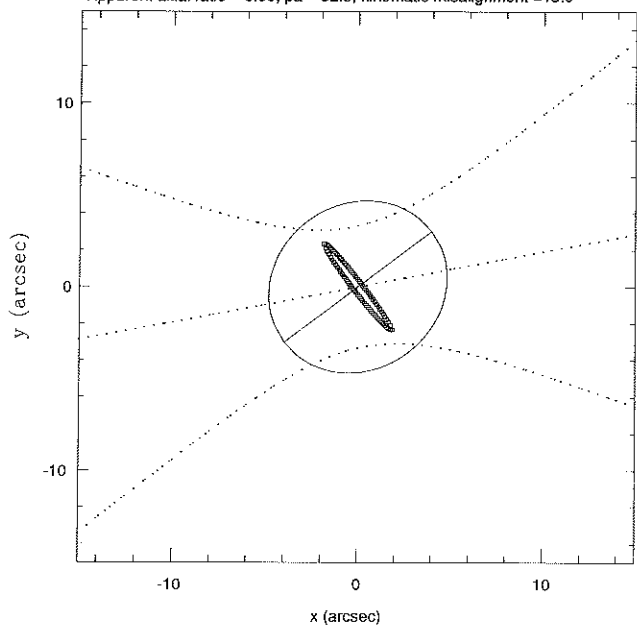
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 52.0$, $\theta= 8.0$
 Apparent axial ratio = 0.90, $pa= 52.8$, kinematic misalignment = 0.0



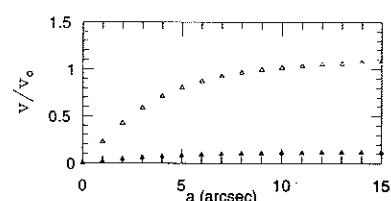
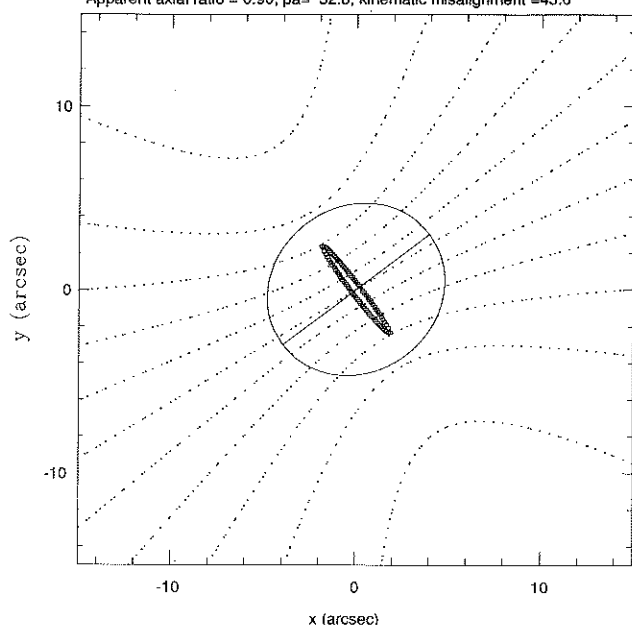
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 52.0$, $\theta= 8.0$
 Apparent axial ratio = 0.90, $pa= 52.8$, kinematic misalignment = 8.0



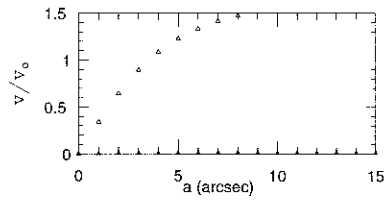
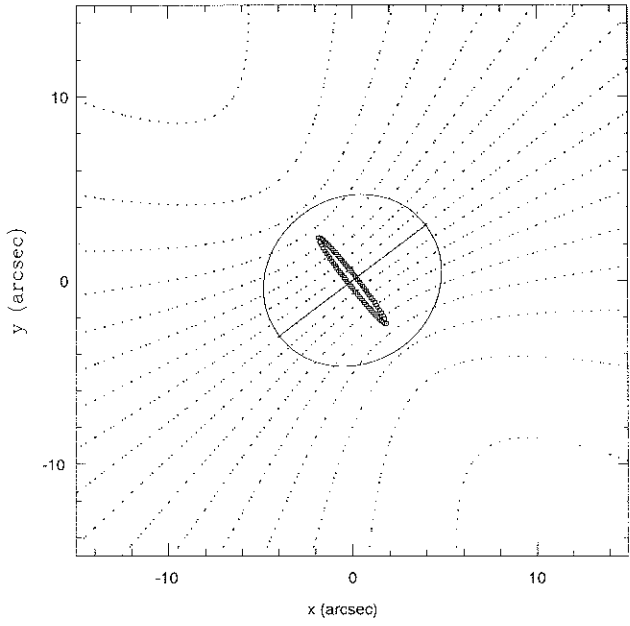
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 52.0$, $\theta= 8.0$
 Apparent axial ratio = 0.90, $pa= 52.8$, kinematic misalignment = 15.0



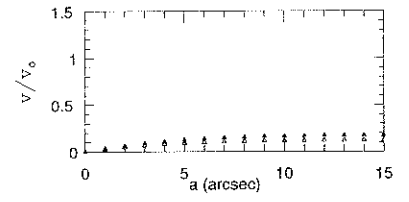
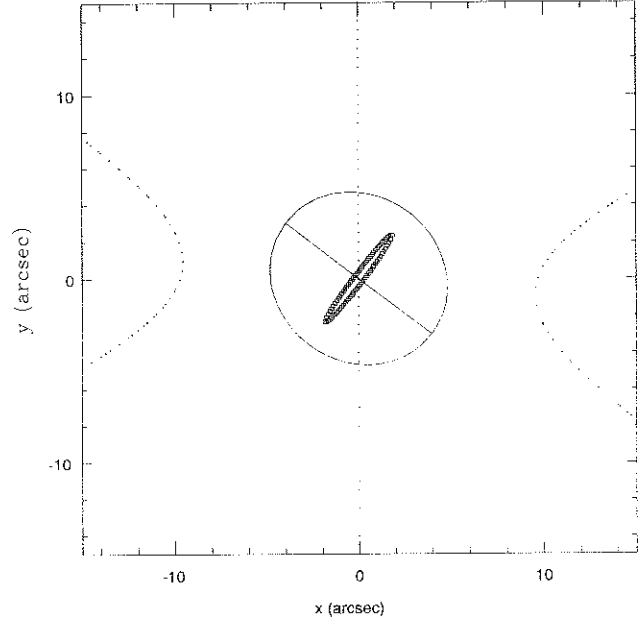
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 52.0$, $\theta= 8.0$
 Apparent axial ratio = 0.90, $pa= 52.8$, kinematic misalignment = 45.0



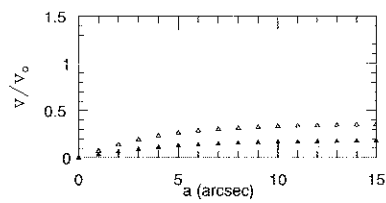
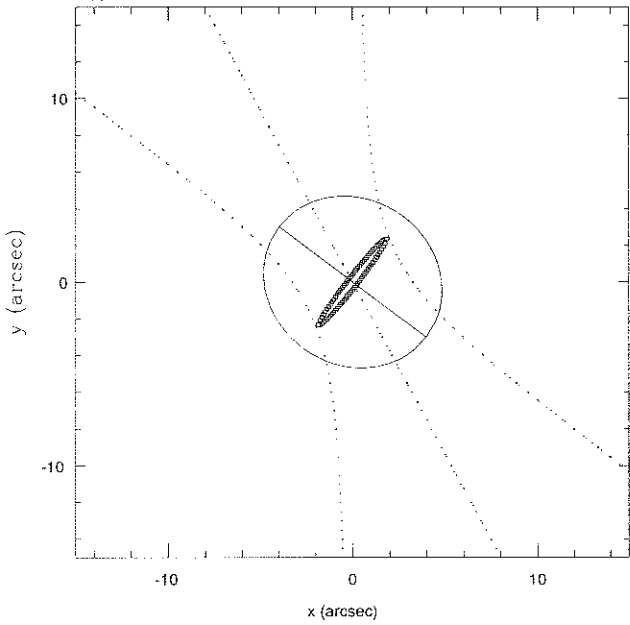
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 52.0$, $\theta= 8.0$
Apparent axial ratio = 0.90, $pa= 52.8$, kinematic misalignment =90.0



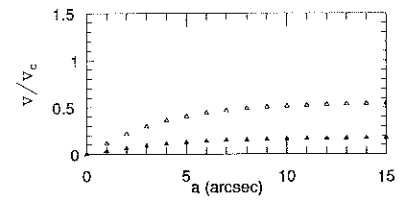
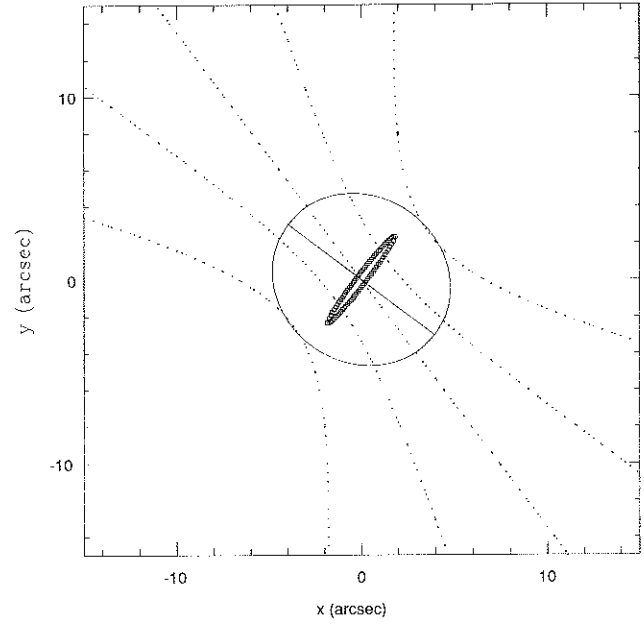
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 128.0$, $\theta= 8.0$
Apparent axial ratio = 0.90, $pa= 127.2$, kinematic misalignment = 0.0



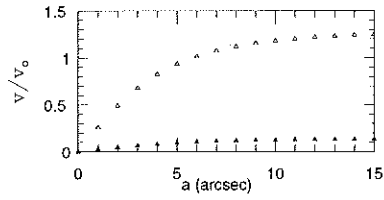
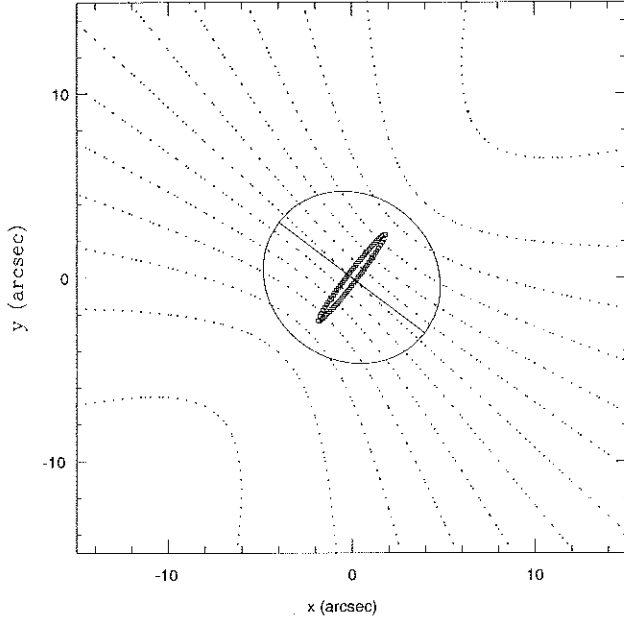
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 128.0$, $\theta= 8.0$
Apparent axial ratio = 0.90, $pa= 127.2$, kinematic misalignment = 8.0



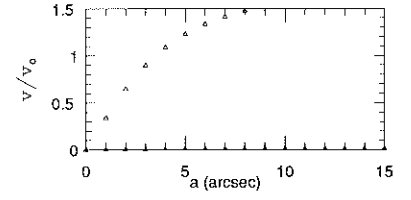
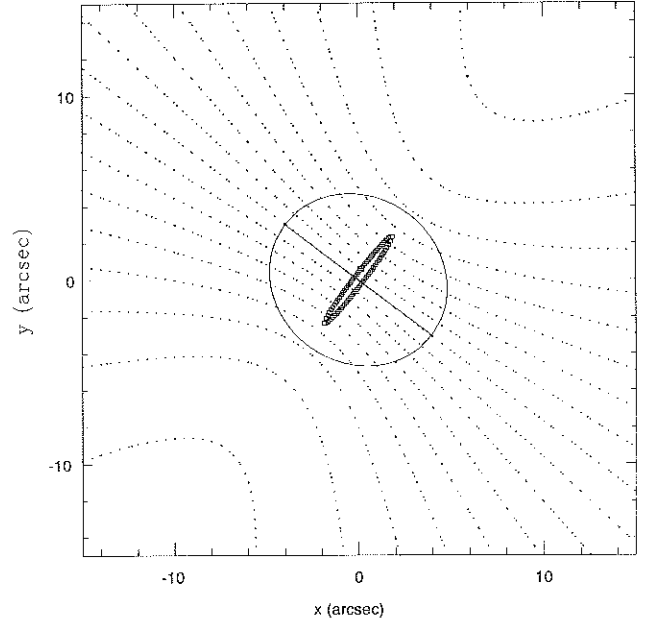
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 128.0$, $\theta= 8.0$
Apparent axial ratio = 0.90, $pa= 127.2$, kinematic misalignment =15.0



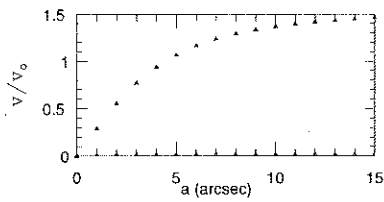
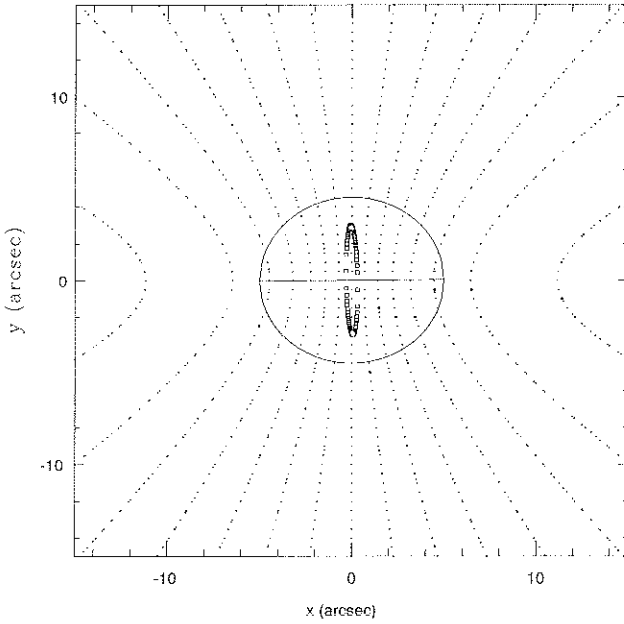
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=128.0$, $\theta=8.0$
 Apparent axial ratio = 0.90, $pa=127.2$, kinematic misalignment =45.0



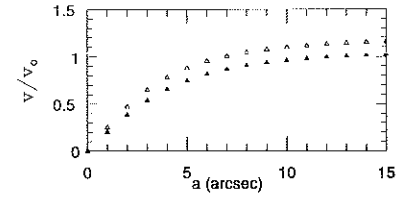
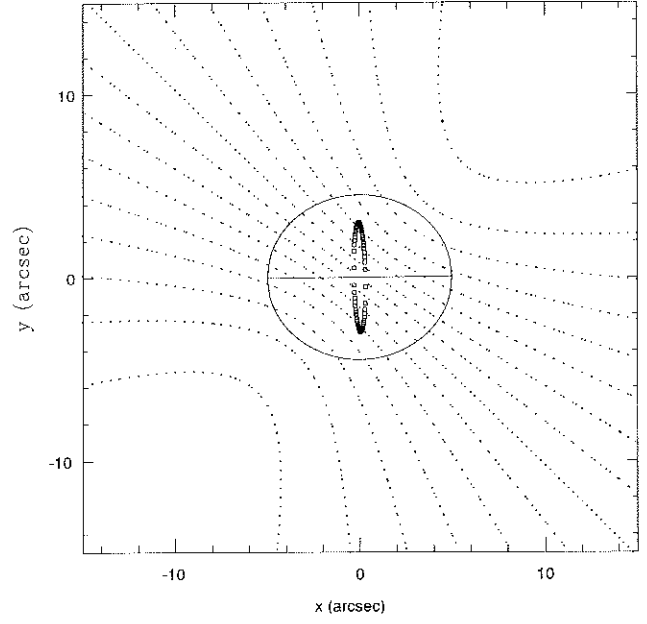
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=128.0$, $\theta=8.0$
 Apparent axial ratio = 0.90, $pa=127.2$, kinematic misalignment =90.0



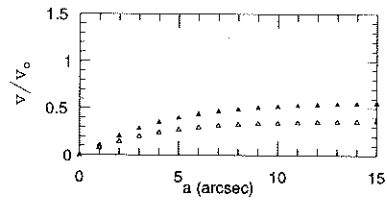
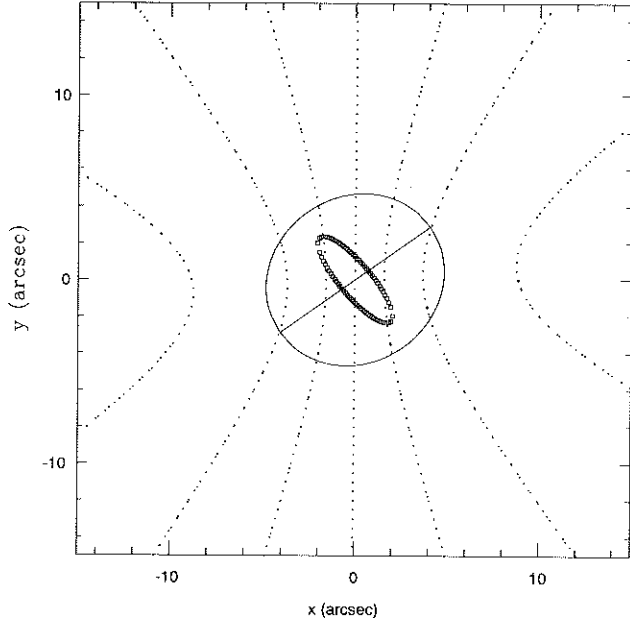
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=84.0$, $\theta=80.0$
 Apparent axial ratio = 0.90, $pa=89.5$, kinematic misalignment = 0.0



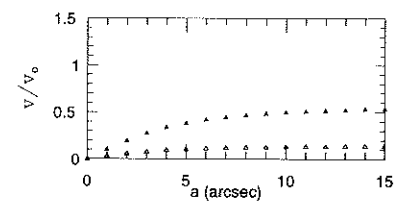
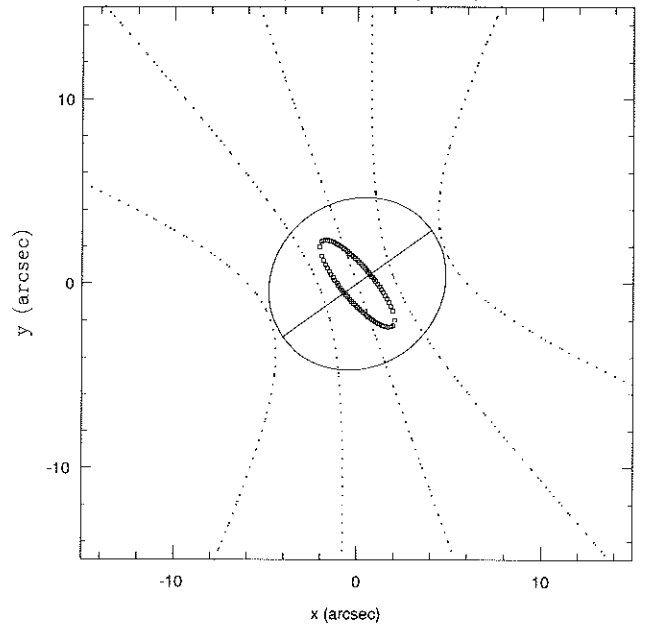
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=84.0$, $\theta=80.0$
 Apparent axial ratio = 0.90, $pa=89.5$, kinematic misalignment =45.0



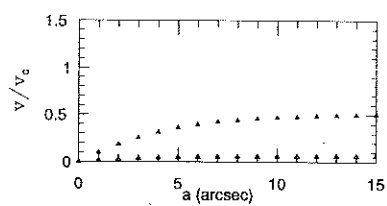
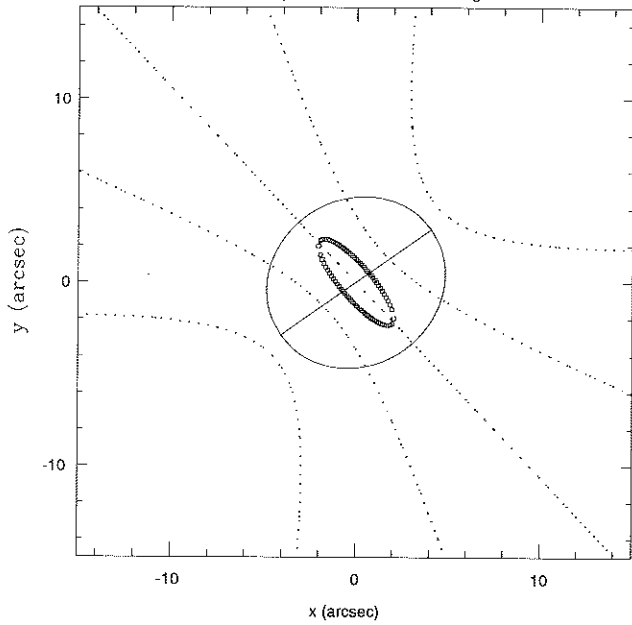
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 47.0$, $\theta= 25.0$
Apparent axial ratio = 0.90, $pa= 54.5$, kinematic misalignment = 0.0



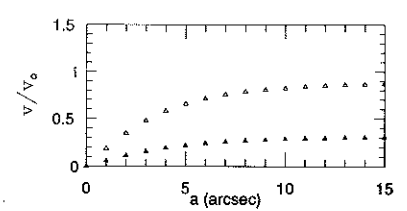
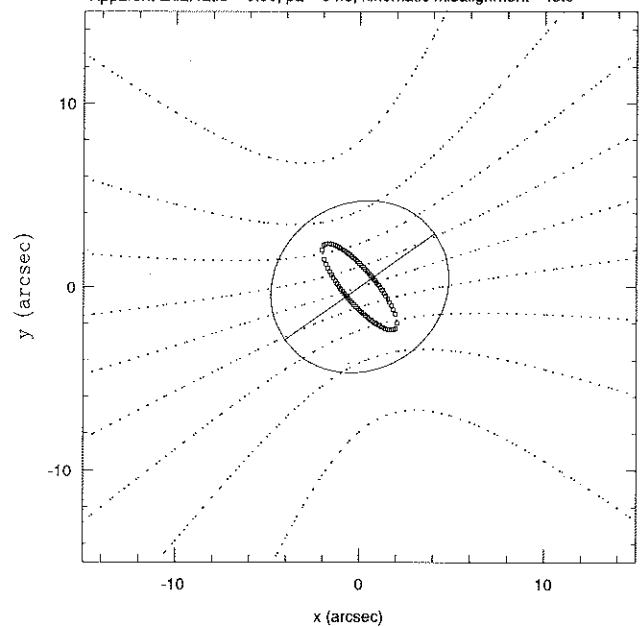
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 47.0$, $\theta= 25.0$
Apparent axial ratio = 0.90, $pa= 54.5$, kinematic misalignment = 8.0

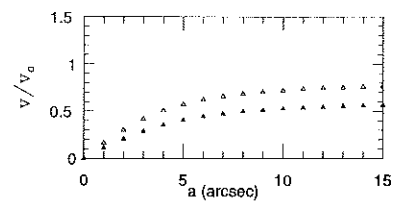
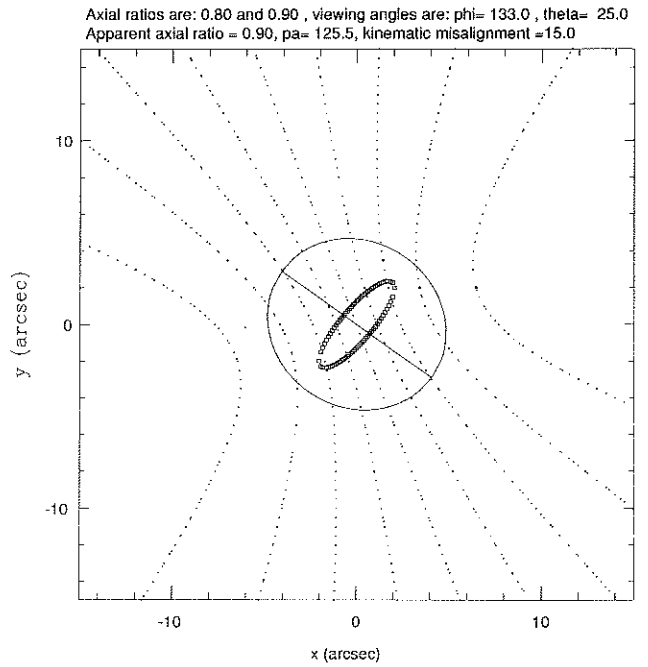
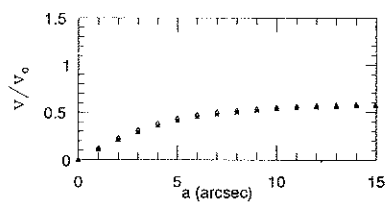
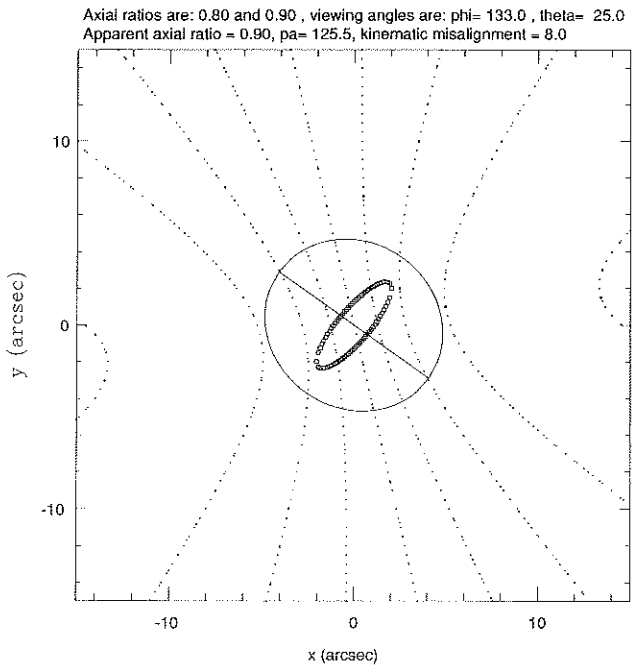
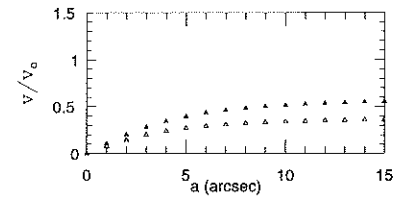
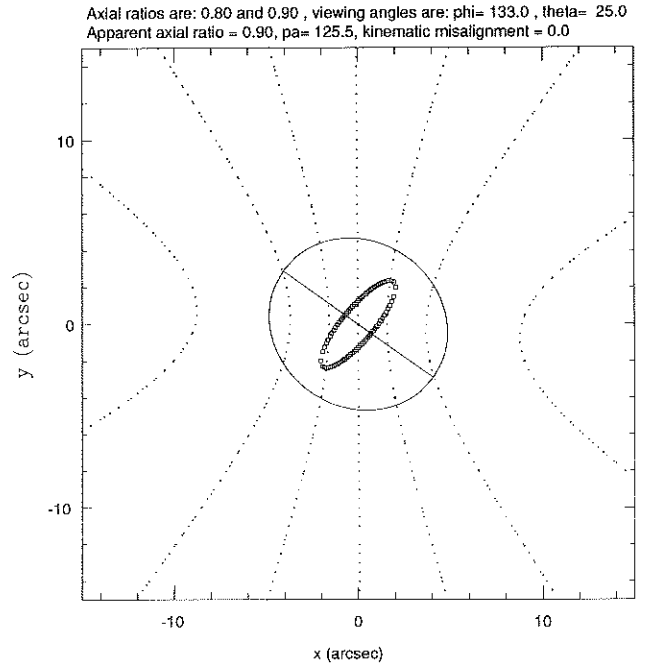
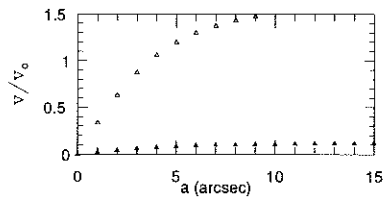
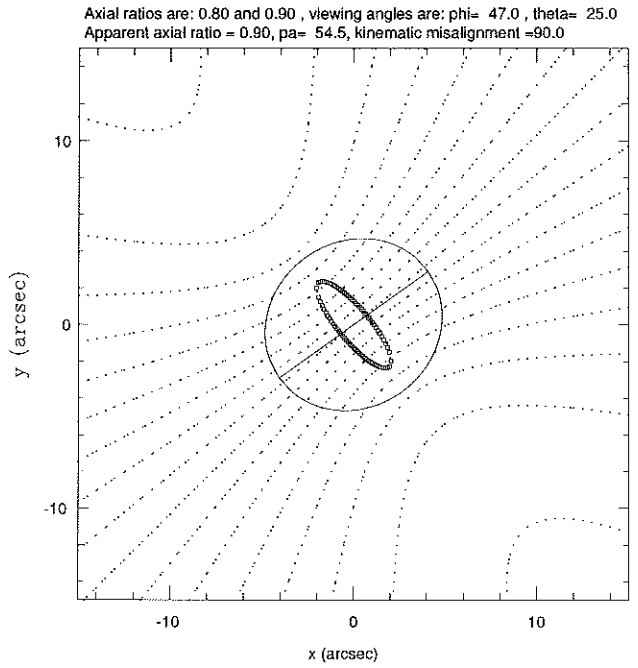


Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 47.0$, $\theta= 25.0$
Apparent axial ratio = 0.90, $pa= 54.5$, kinematic misalignment = 15.0

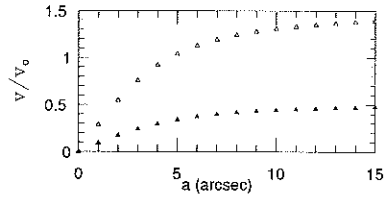
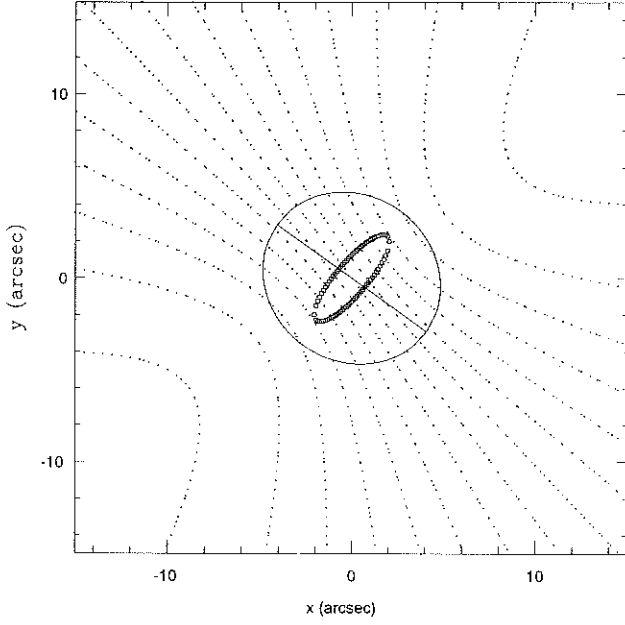


Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 47.0$, $\theta= 25.0$
Apparent axial ratio = 0.90, $pa= 54.5$, kinematic misalignment = 45.0

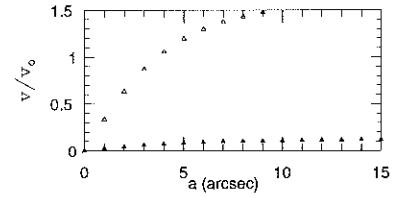
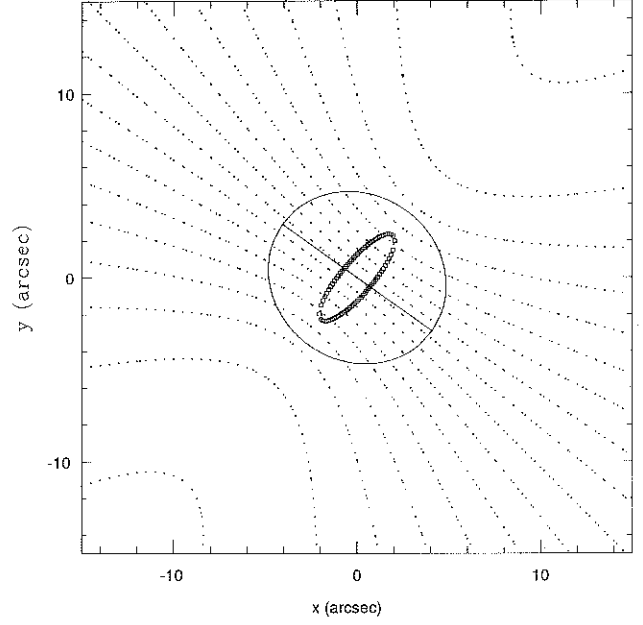




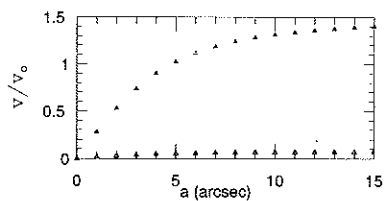
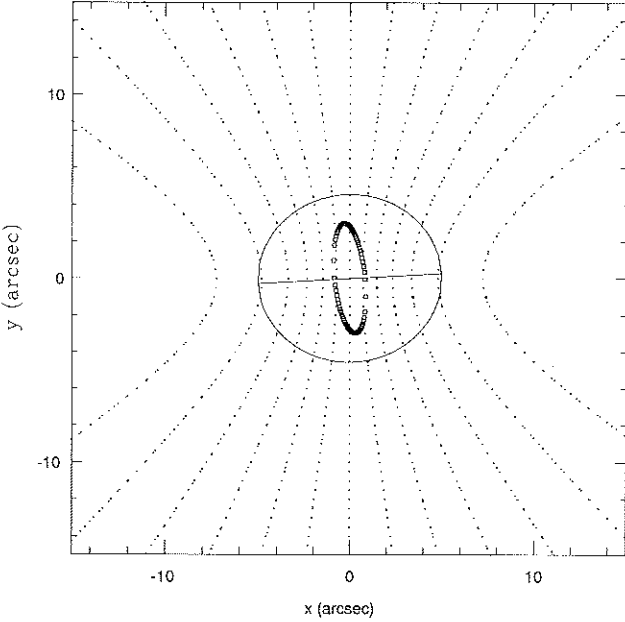
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=133.0$, $\theta=25.0$
Apparent axial ratio = 0.90, $pa=125.5$, kinematic misalignment = -45.0



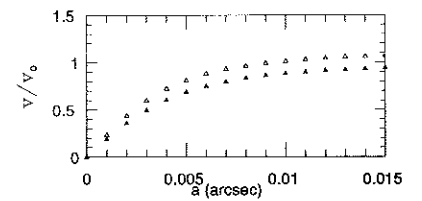
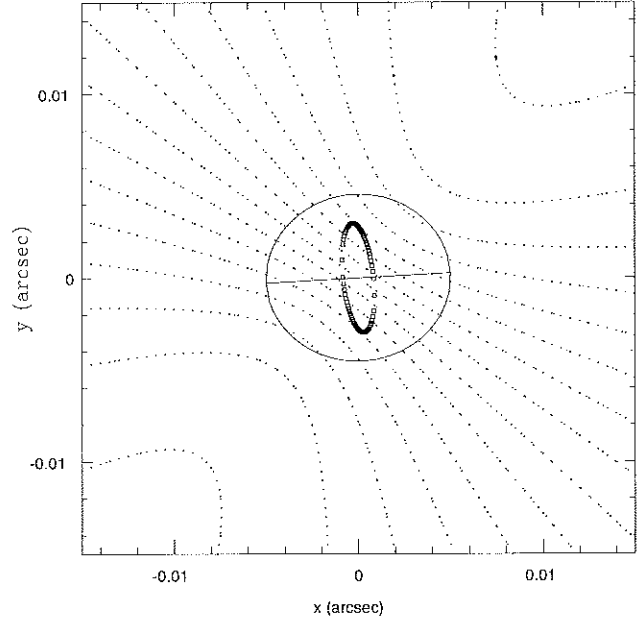
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=133.0$, $\theta=25.0$
Apparent axial ratio = 0.90, $pa=125.5$, kinematic misalignment = 90.0



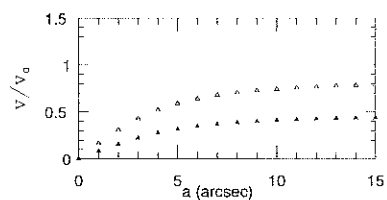
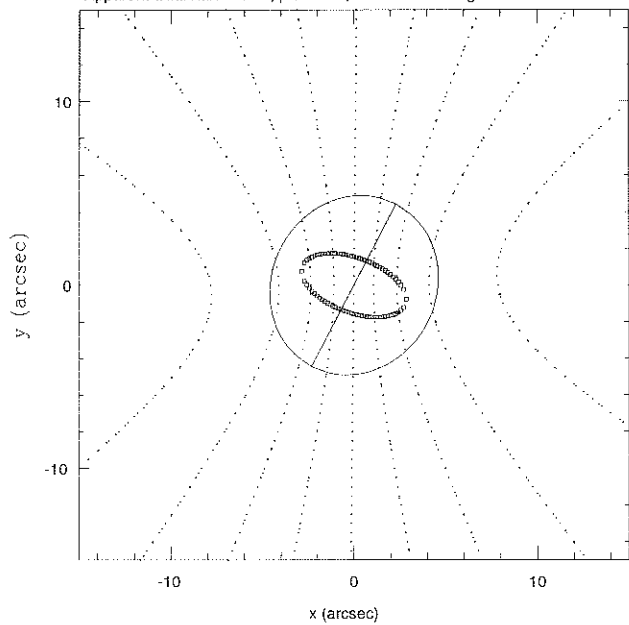
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=73.0$, $\theta=70.0$
Apparent axial ratio = 0.91, $pa=86.9$, kinematic misalignment = 0.0



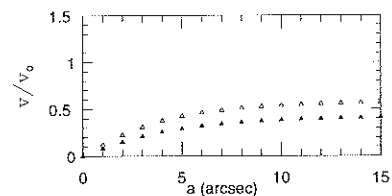
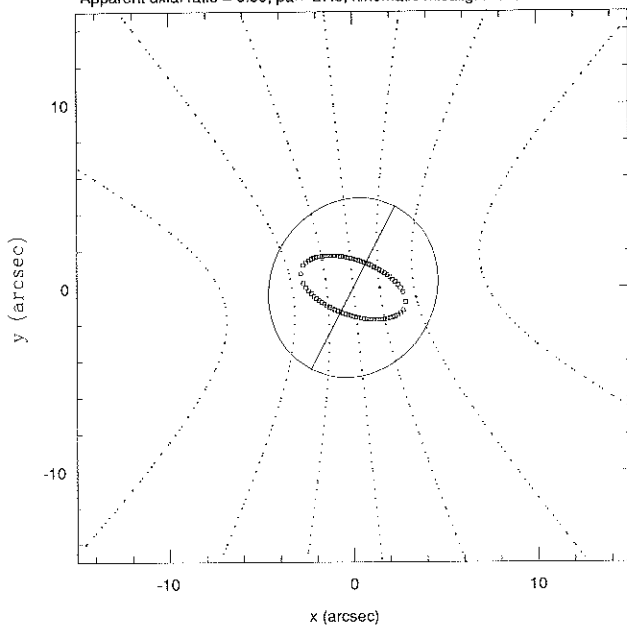
Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=73.0$, $\theta=70.0$
Apparent axial ratio = 0.91, $pa=86.9$, kinematic misalignment = 45.0



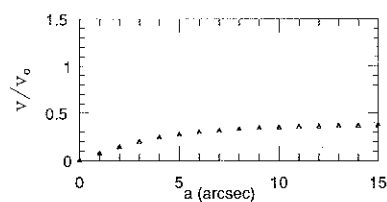
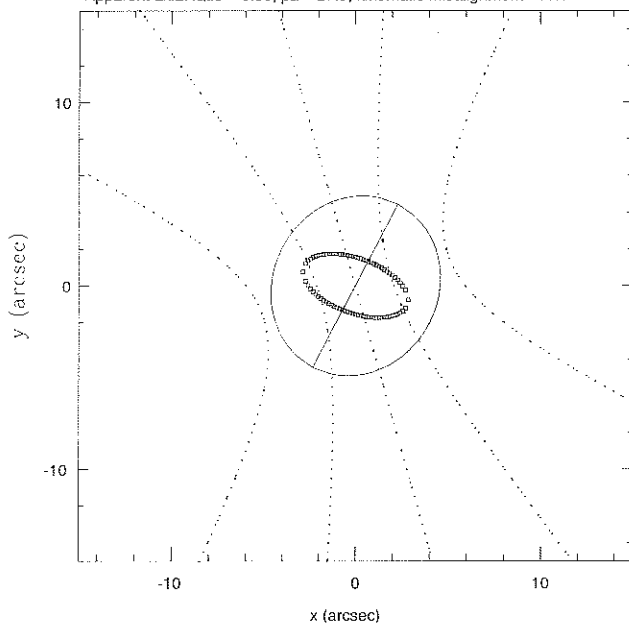
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=17.5^\circ$, $\theta=31.5^\circ$
 Apparent axial ratio = 0.90, $\rho_a=27.5$, kinematic misalignment = 0.0



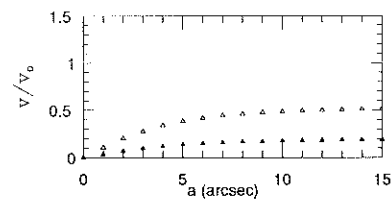
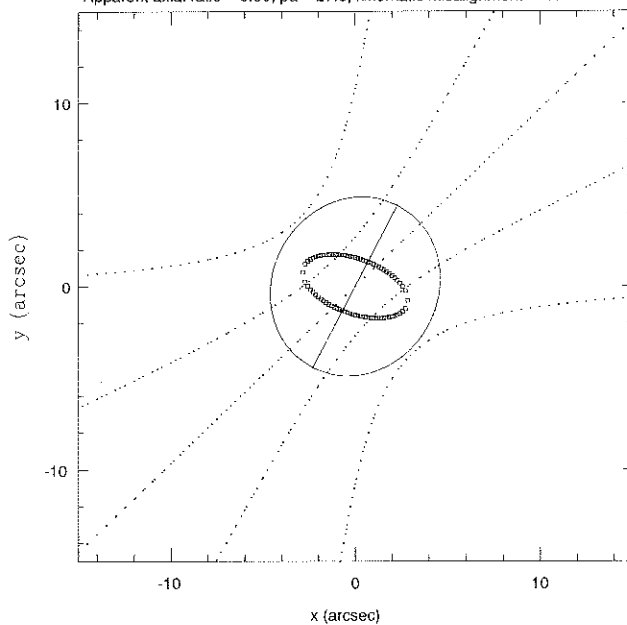
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=17.5^\circ$, $\theta=31.5^\circ$
 Apparent axial ratio = 0.90, $\rho_a=27.5$, kinematic misalignment = 8.0



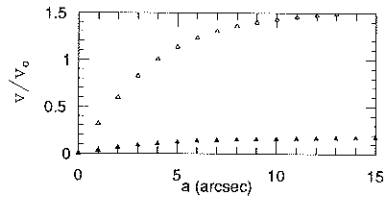
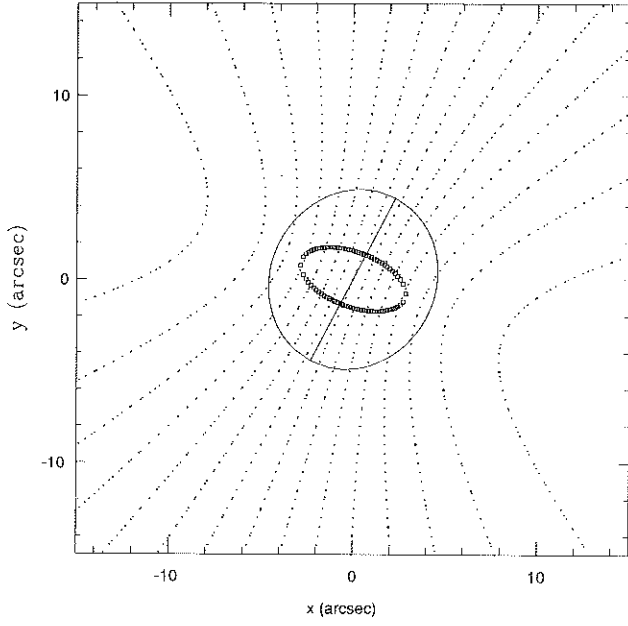
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=17.5^\circ$, $\theta=31.5^\circ$
 Apparent axial ratio = 0.90, $\rho_a=27.5$, kinematic misalignment = 15.0



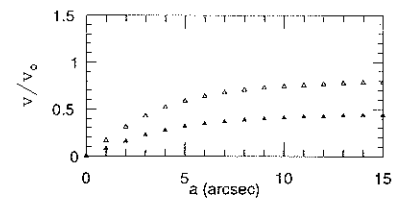
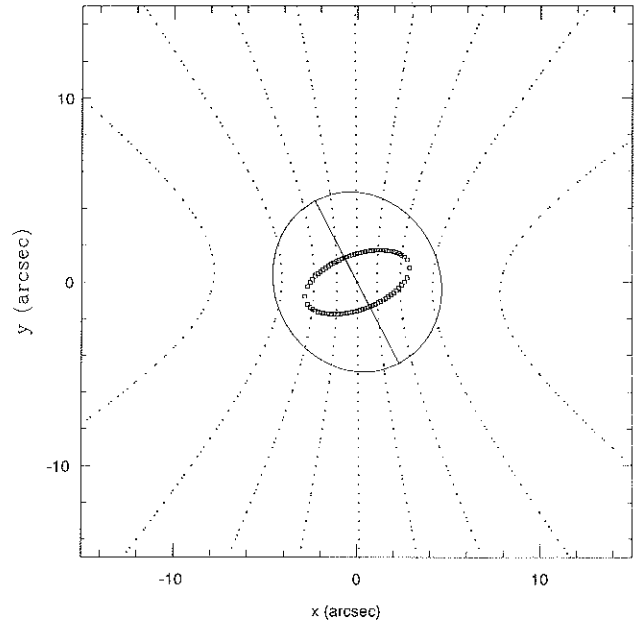
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=17.5^\circ$, $\theta=31.5^\circ$
 Apparent axial ratio = 0.90, $\rho_a=27.5$, kinematic misalignment = 45.0



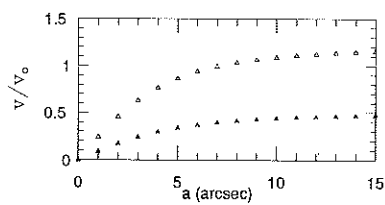
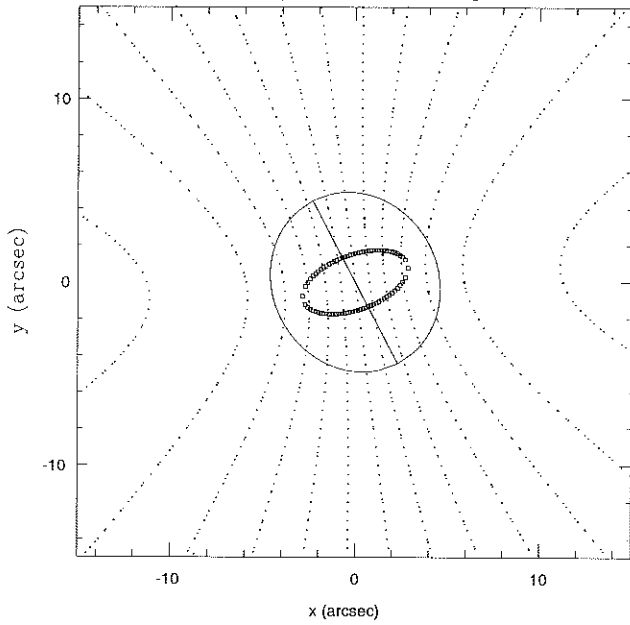
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=17.5$, $\theta=31.5$
Apparent axial ratio = 0.90, $\phi_a=27.5$, kinematic misalignment = 90.0



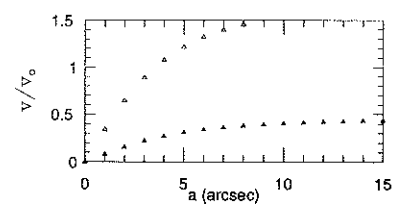
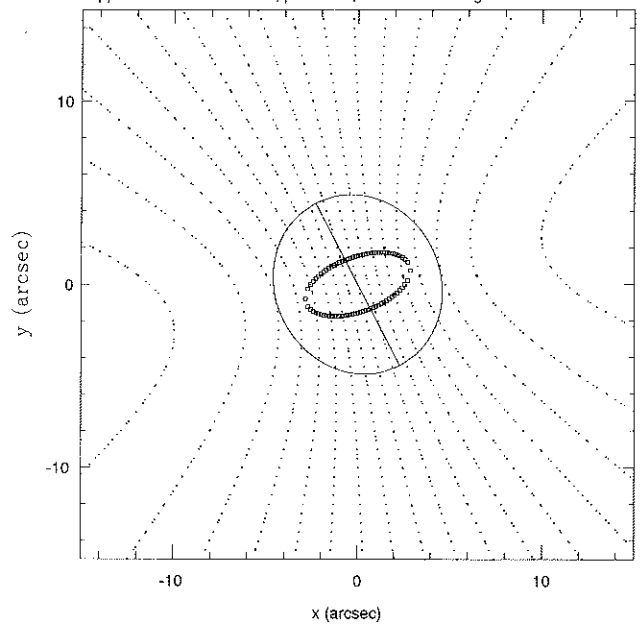
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=162.5$, $\theta=31.5$
Apparent axial ratio = 0.90, $\phi_a=-27.5$, kinematic misalignment = 0.0



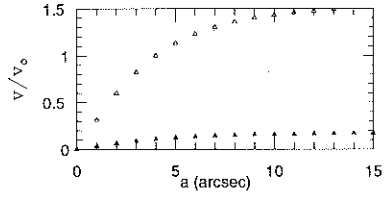
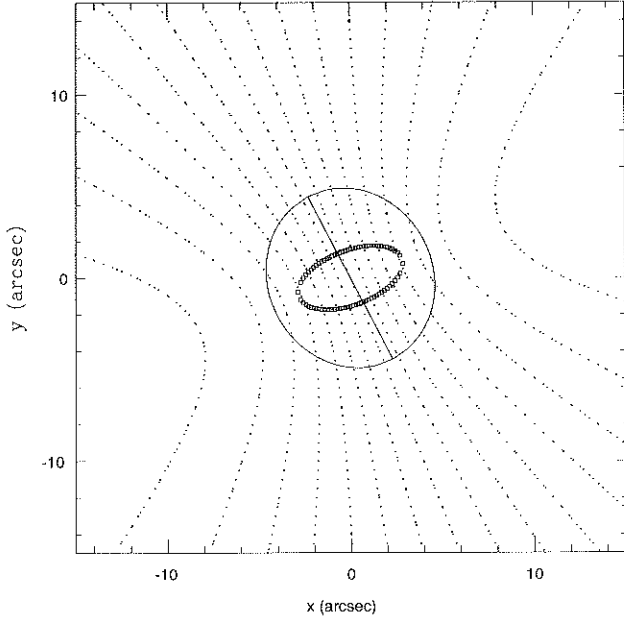
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=162.5$, $\theta=31.5$
Apparent axial ratio = 0.90, $\phi_a=-27.5$, kinematic misalignment = 15.0



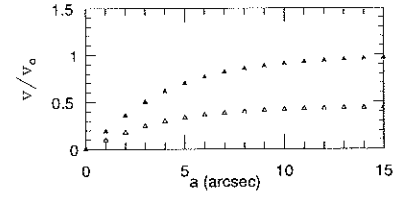
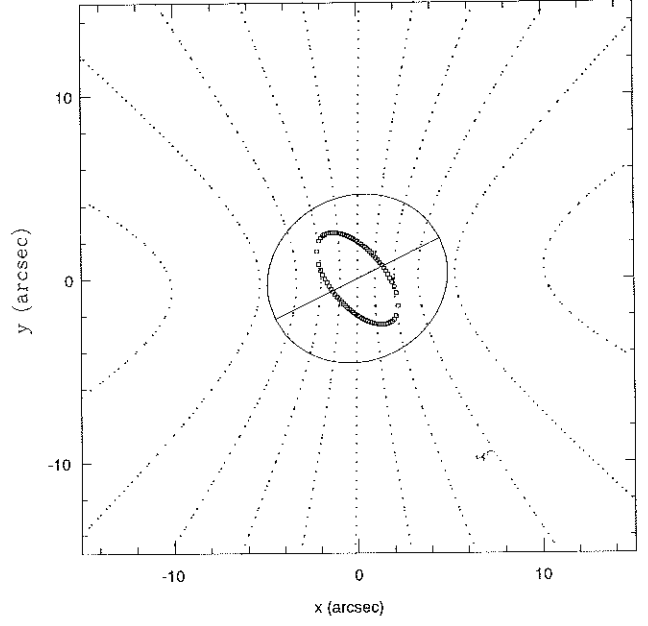
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=162.5$, $\theta=31.5$
Apparent axial ratio = 0.90, $\phi_a=-27.5$, kinematic misalignment = 45.0



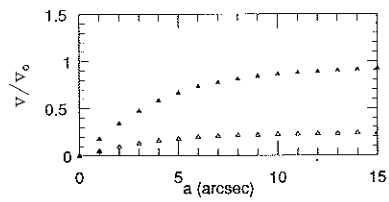
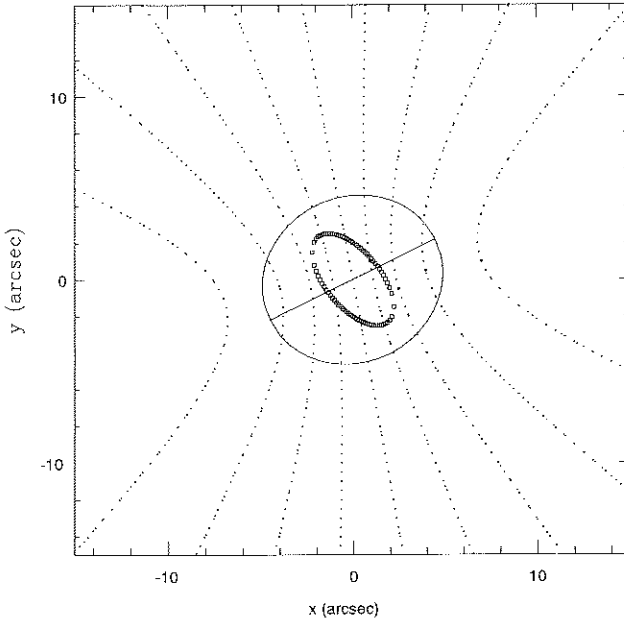
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi = 162.5$, $\theta = 31.5$
 Apparent axial ratio = 0.90, $pa = -27.5$, kinematic misalignment = 90.0



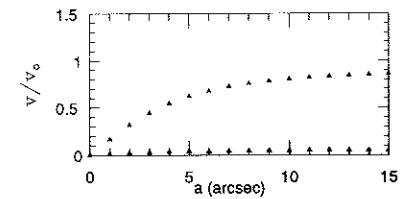
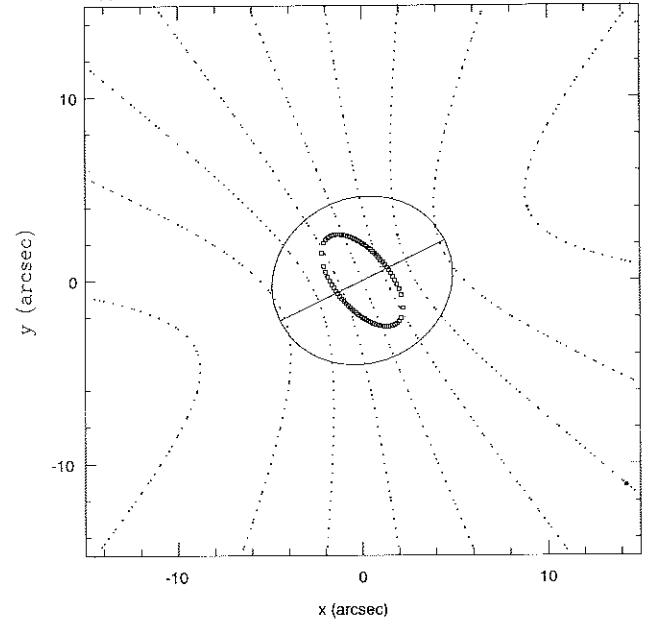
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi = 42.5$, $\theta = 42.5$
 Apparent axial ratio = 0.90, $pa = 63.9$, kinematic misalignment = 0.0



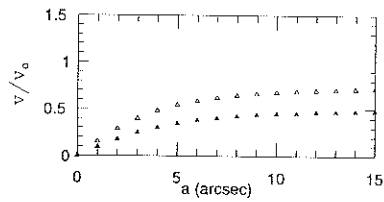
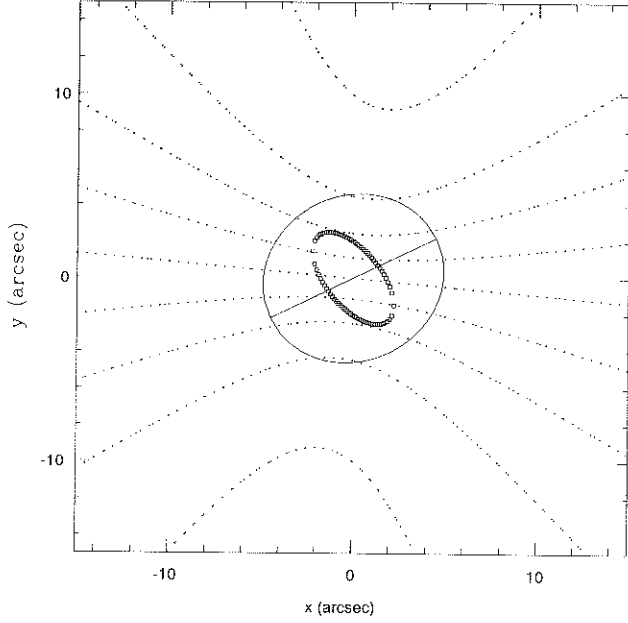
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi = 42.5$, $\theta = 42.5$
 Apparent axial ratio = 0.90, $pa = 63.9$, kinematic misalignment = 8.0



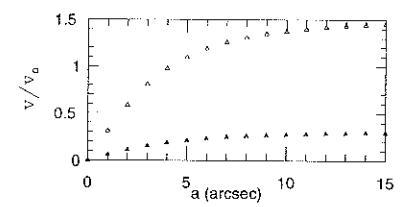
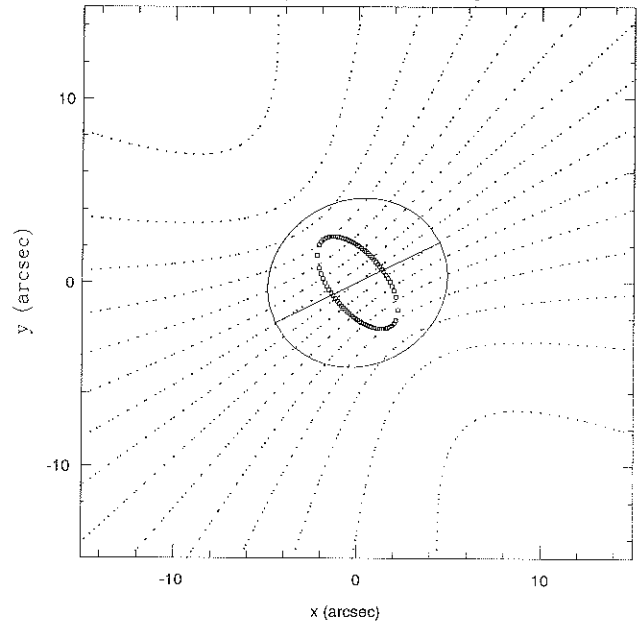
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi = 42.5$, $\theta = 42.5$
 Apparent axial ratio = 0.90, $pa = 63.9$, kinematic misalignment = 15.0



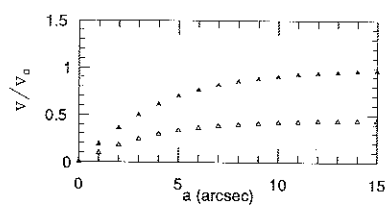
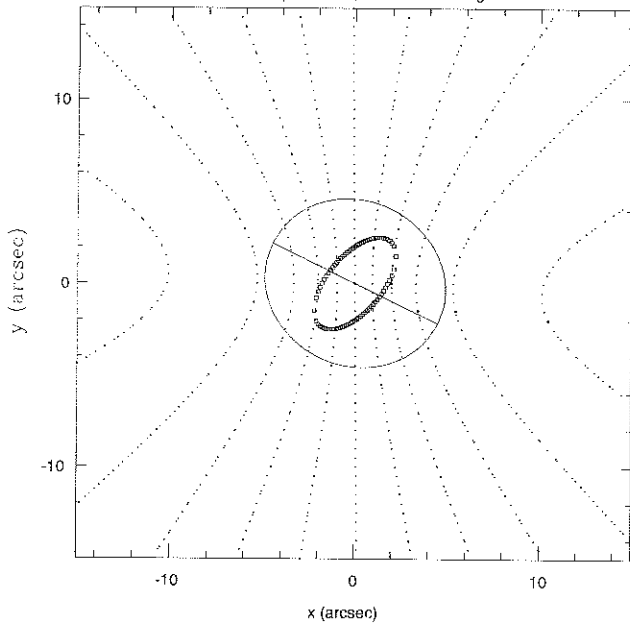
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 42.5$, $\theta= 42.5$
Apparent axial ratio = 0.90, $pa= 63.9$, kinematic misalignment =45.0



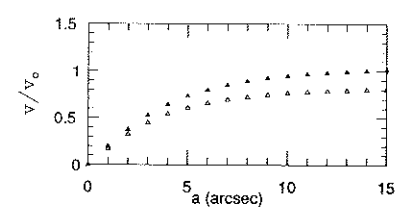
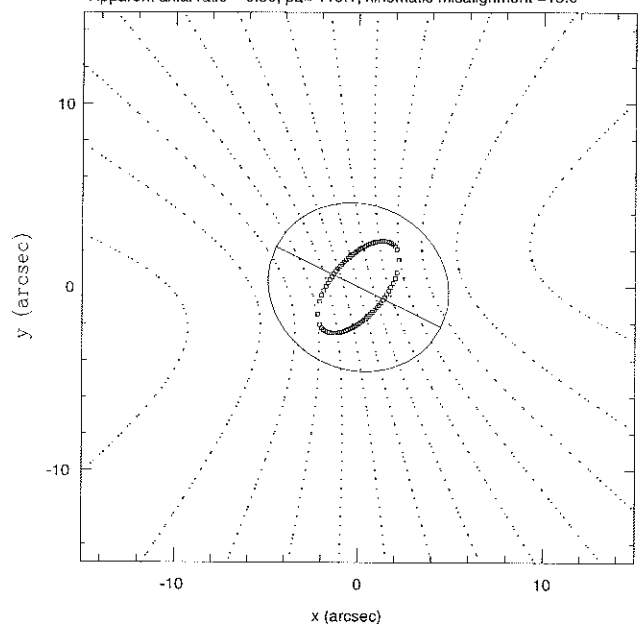
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 42.5$, $\theta= 42.5$
Apparent axial ratio = 0.90, $pa= 63.9$, kinematic misalignment =90.0



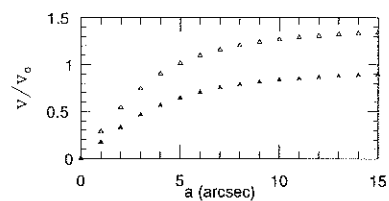
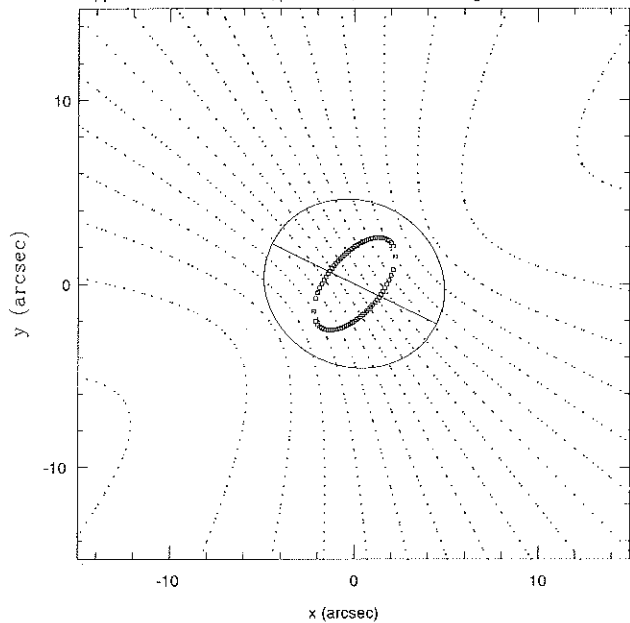
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 137.5$, $\theta= 42.5$
Apparent axial ratio = 0.90, $pa= 116.1$, kinematic misalignment = 0.0



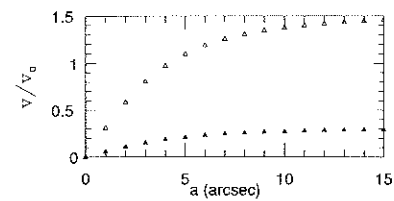
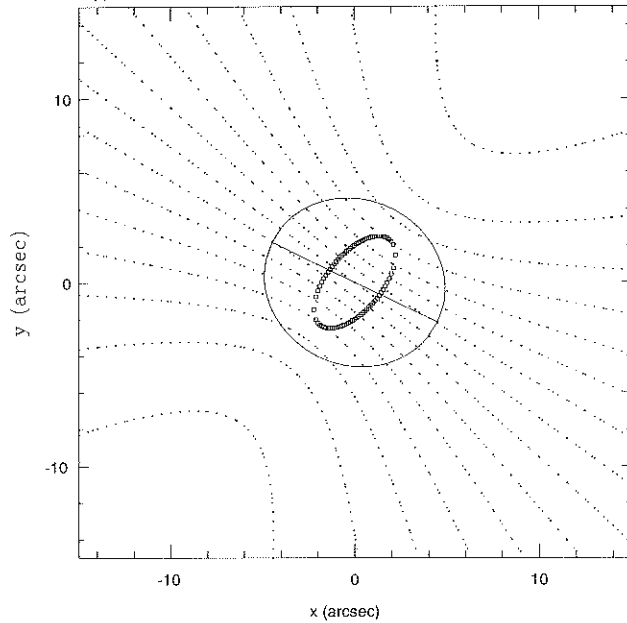
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 137.5$, $\theta= 42.5$
Apparent axial ratio = 0.90, $pa= 116.1$, kinematic misalignment =15.0



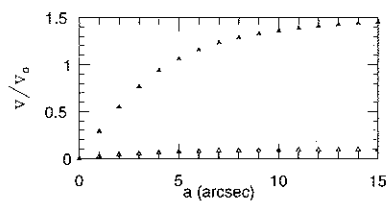
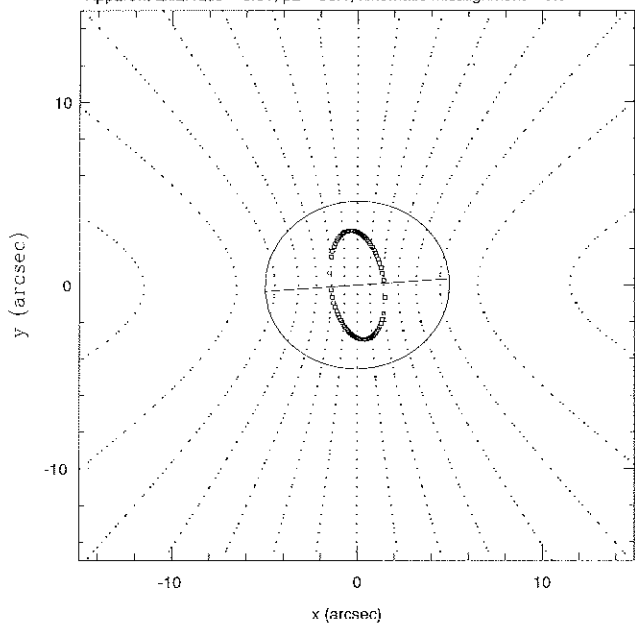
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=137.5$, $\theta=42.5$
 Apparent axial ratio = 0.90, $pa=116.1$, kinematic misalignment =45.0



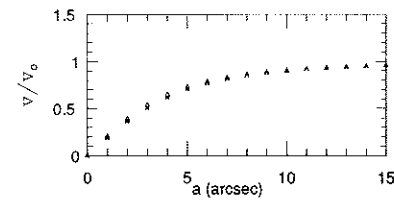
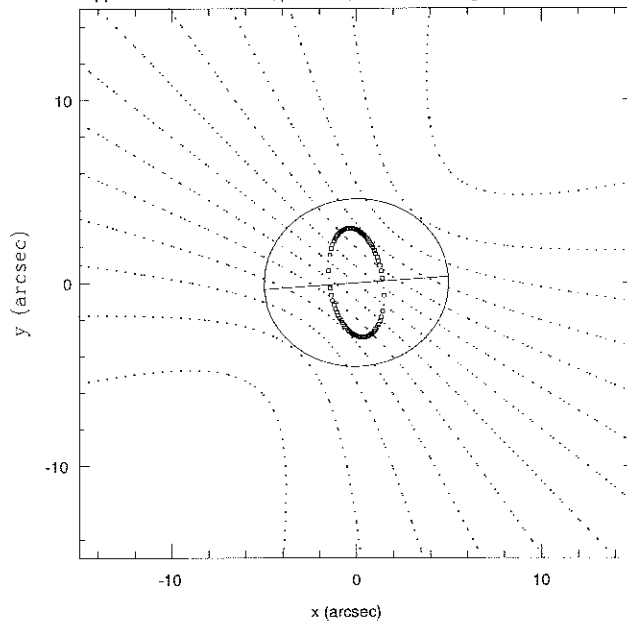
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=137.5$, $\theta=42.5$
 Apparent axial ratio = 0.90, $pa=116.1$, kinematic misalignment =90.0



Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=60.0$, $\theta=75.0$
 Apparent axial ratio = 0.91, $pa=86.1$, kinematic misalignment = 0.0

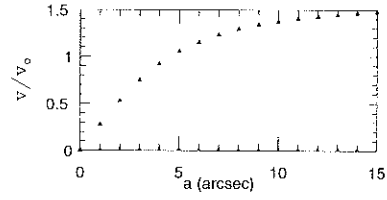
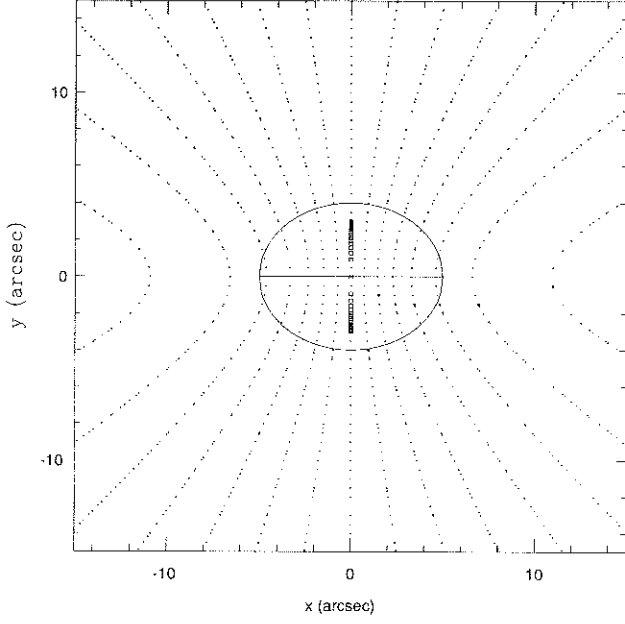


Axial ratios are: 0.90 and 0.95 , viewing angles are: $\phi=60.0$, $\theta=75.0$
 Apparent axial ratio = 0.91, $pa=86.1$, kinematic misalignment =45.0

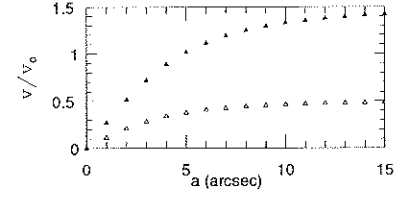
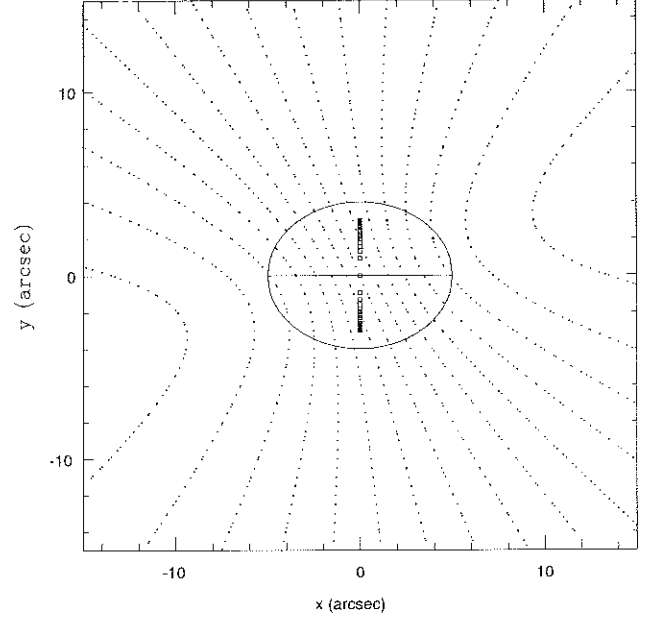


E2 GALAXIES

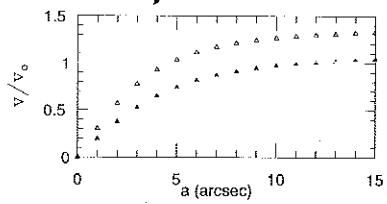
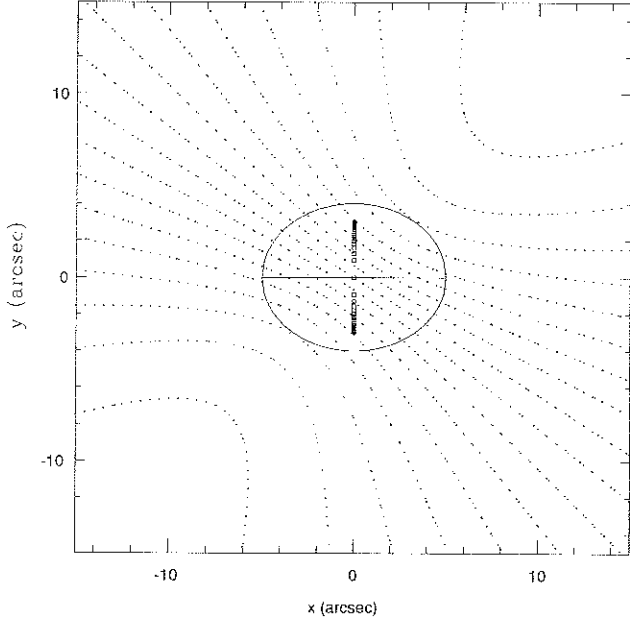
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 90.0$, $\theta= 90.0$
Apparent axial ratio = 0.80, $\text{pa}= 90.0$, kinematic misalignment = 0.0



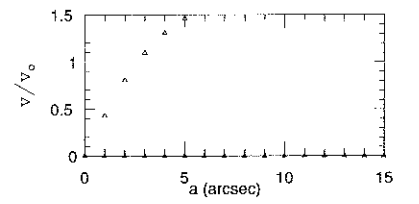
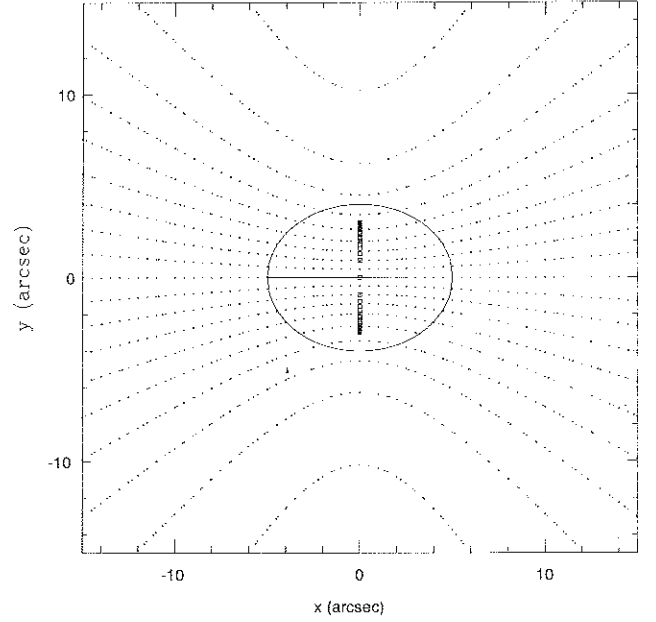
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 90.0$, $\theta= 90.0$
Apparent axial ratio = 0.80, $\text{pa}= 90.0$, kinematic misalignment = 15.0



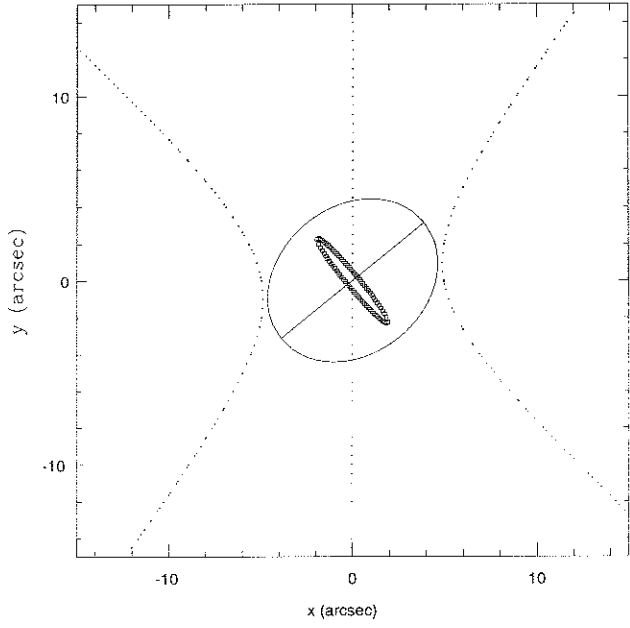
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 90.0$, $\theta= 90.0$
Apparent axial ratio = 0.80, $\text{pa}= 90.0$, kinematic misalignment = 45.0



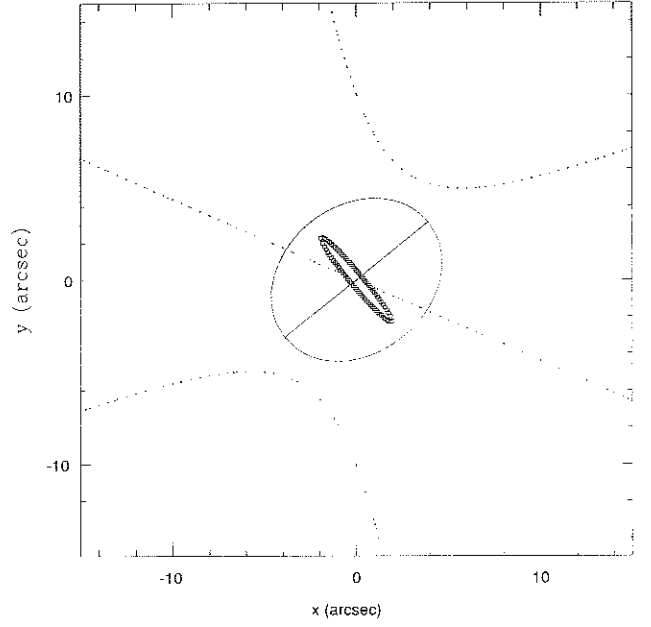
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi= 90.0$, $\theta= 90.0$
Apparent axial ratio = 0.80, $\text{pa}= 90.0$, kinematic misalignment = 90.0



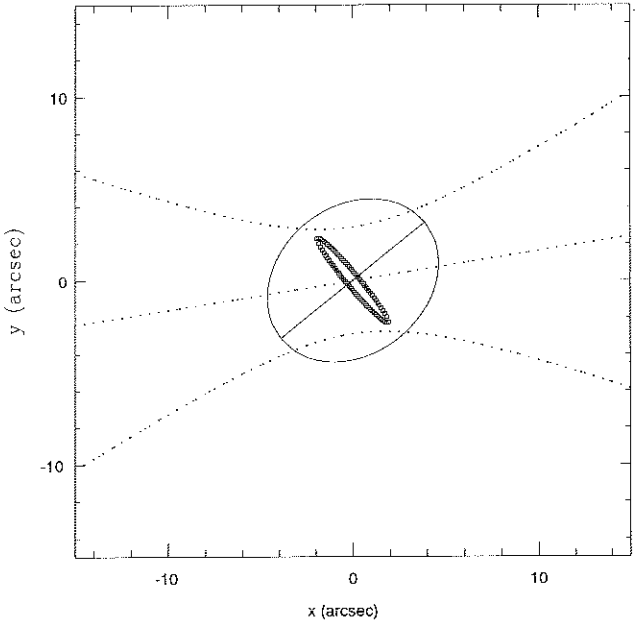
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 50.0$, $\theta= 10.0$
 Apparent axial ratio = 0.80, $pa= 51.1$, kinematic misalignment = 0.0



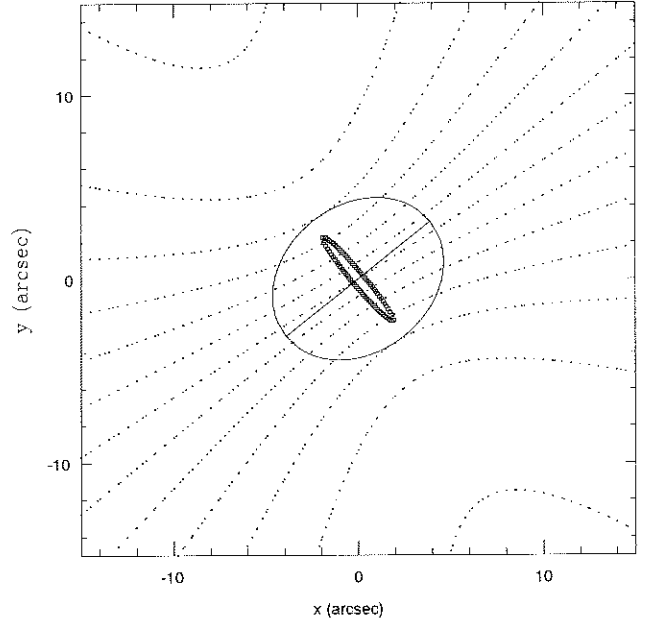
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 50.0$, $\theta= 10.0$
 Apparent axial ratio = 0.80, $pa= 51.1$, kinematic misalignment = 8.0



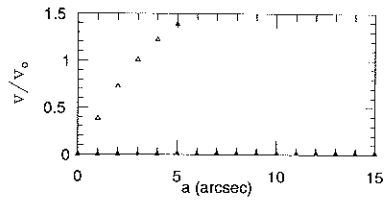
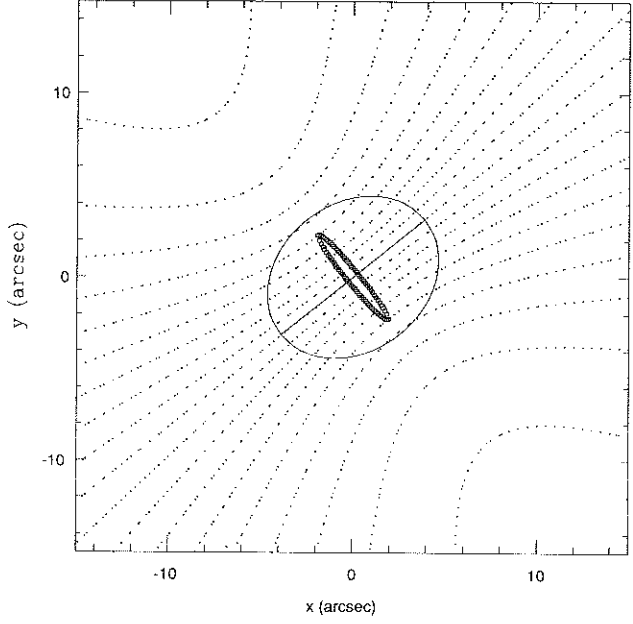
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 50.0$, $\theta= 10.0$
 Apparent axial ratio = 0.80, $pa= 51.1$, kinematic misalignment = 15.0



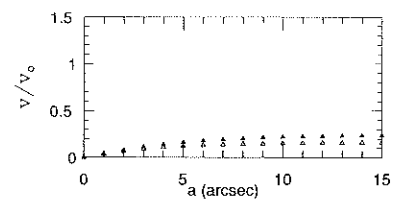
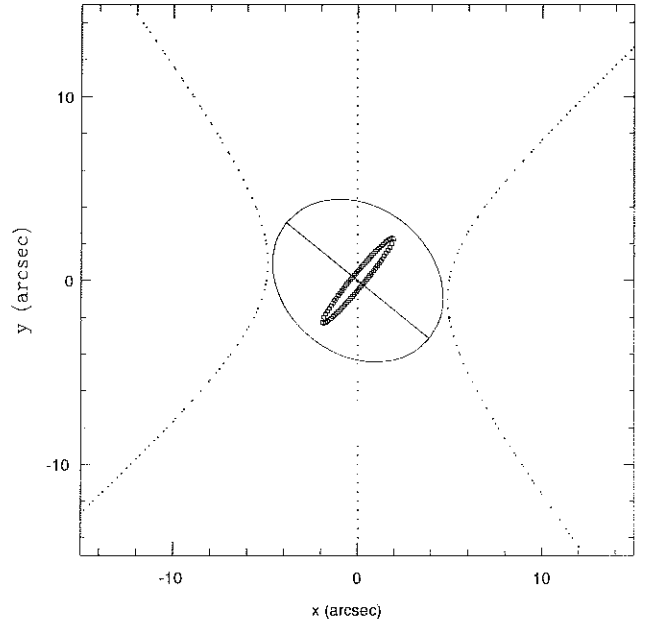
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 50.0$, $\theta= 10.0$
 Apparent axial ratio = 0.80, $pa= 51.1$, kinematic misalignment = 45.0



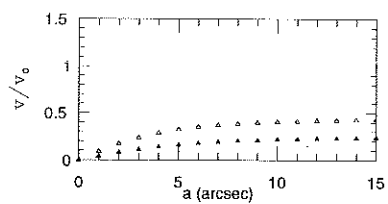
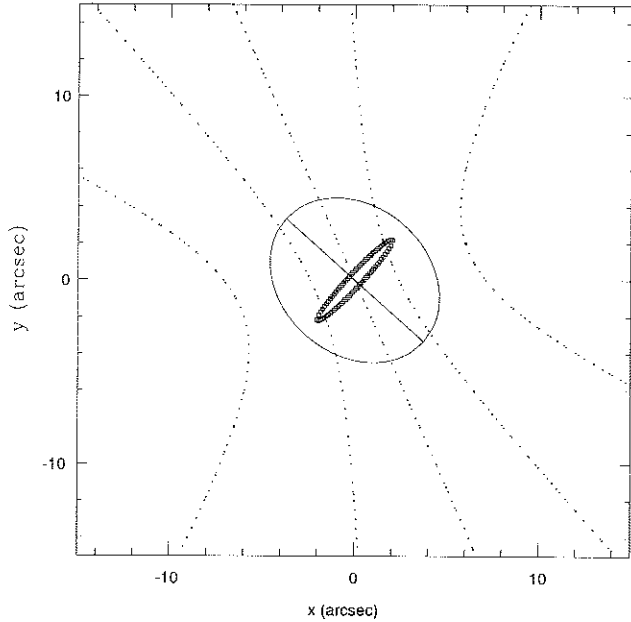
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 50.0$, $\theta= 10.0$
Apparent axial ratio = 0.80, $pa= 51.1$, kinematic misalignment = 90.0



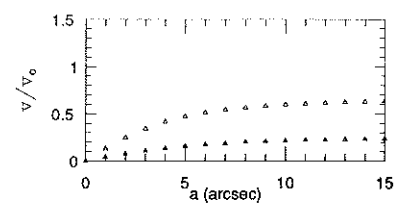
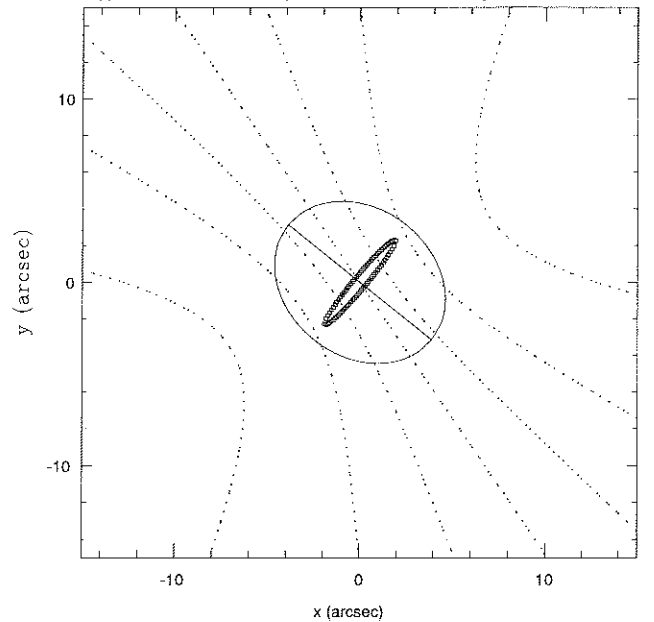
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 130.0$, $\theta= 10.0$
Apparent axial ratio = 0.80, $pa= 128.9$, kinematic misalignment = 0.0

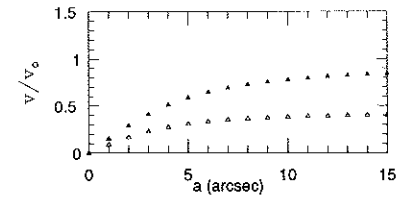
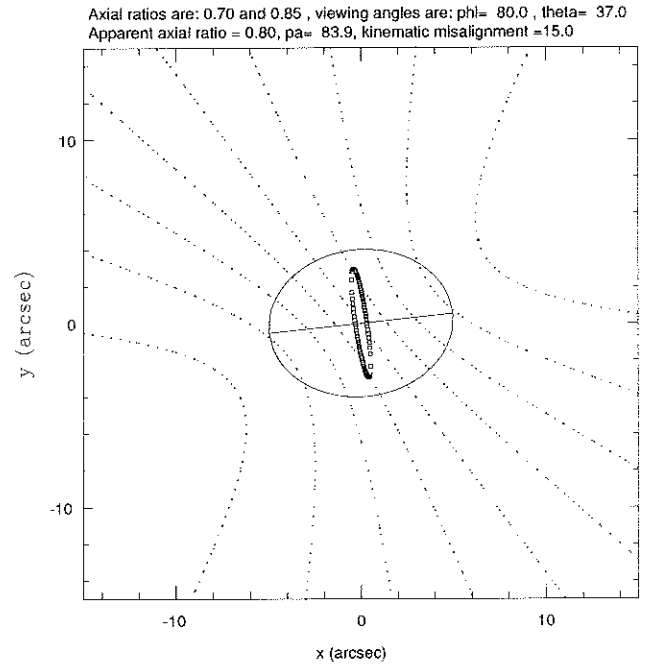
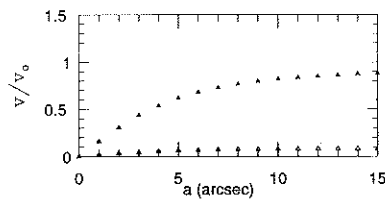
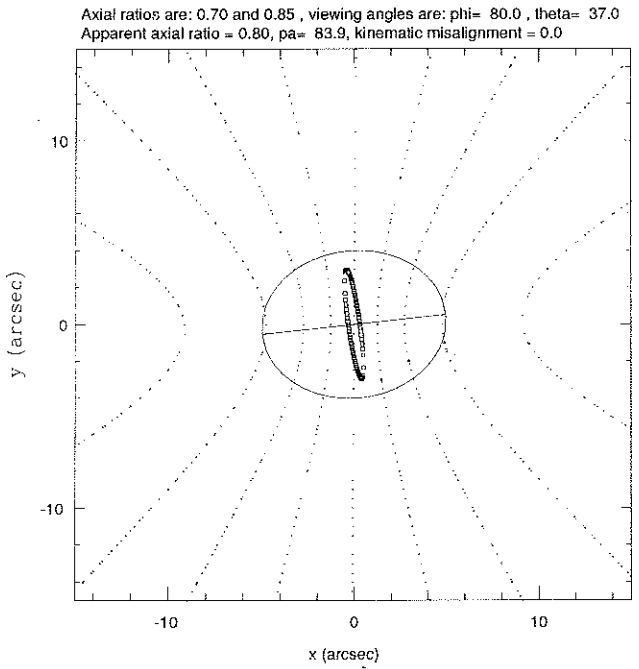
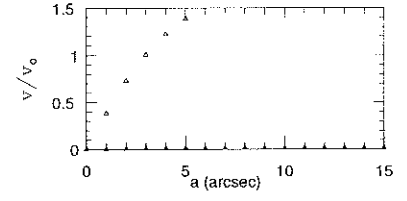
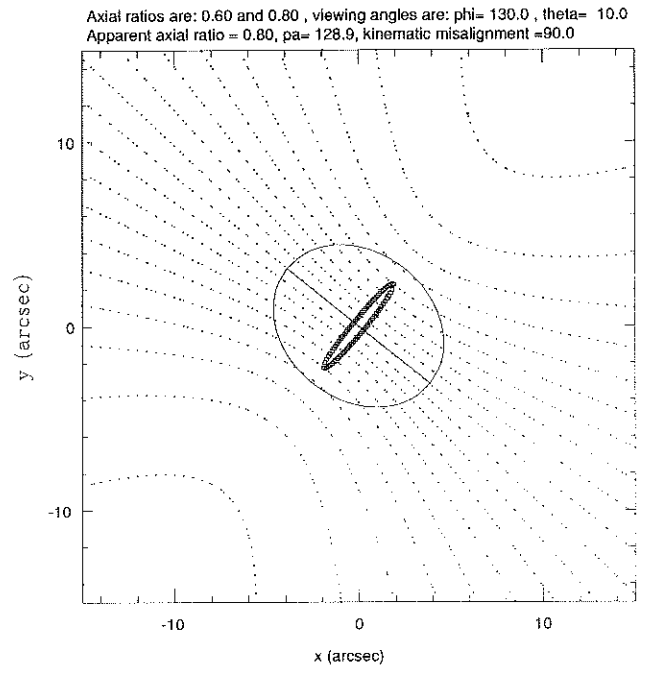
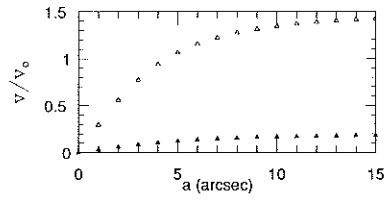
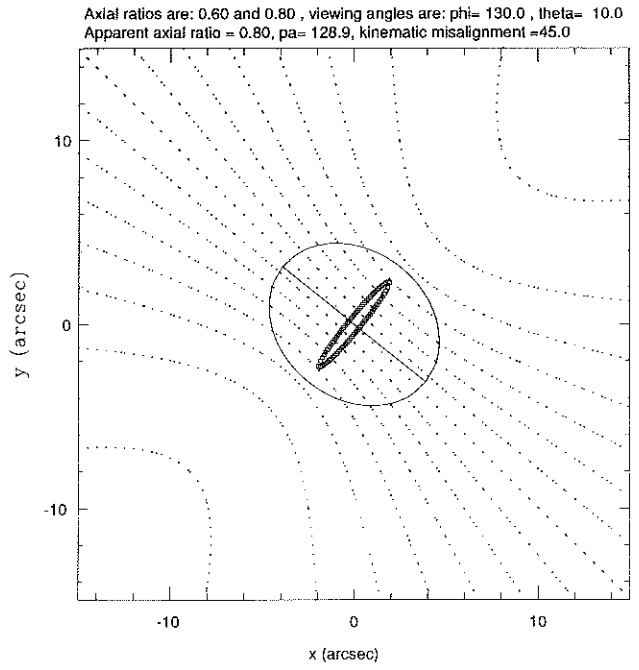


Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 133.0$, $\theta= 10.0$
Apparent axial ratio = 0.80, $pa= 131.9$, kinematic misalignment = 8.0

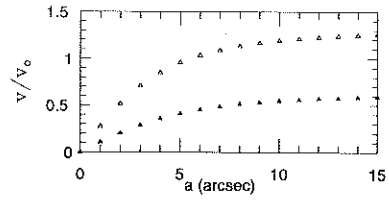
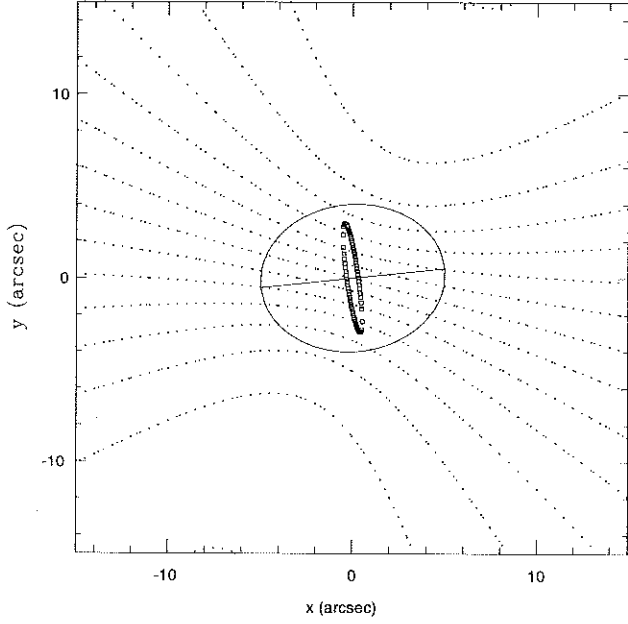


Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 130.0$, $\theta= 10.0$
Apparent axial ratio = 0.80, $pa= 128.9$, kinematic misalignment = 15.0

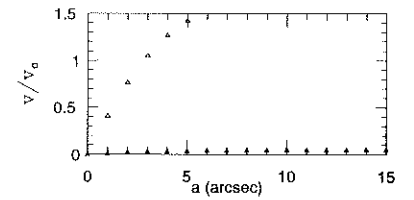
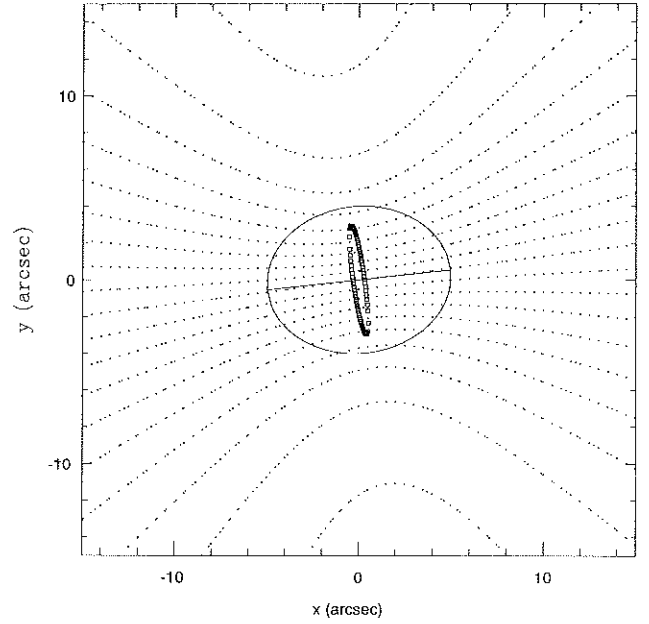




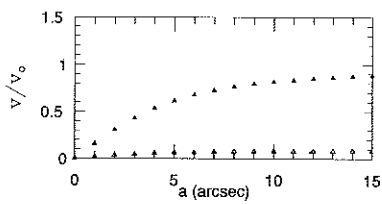
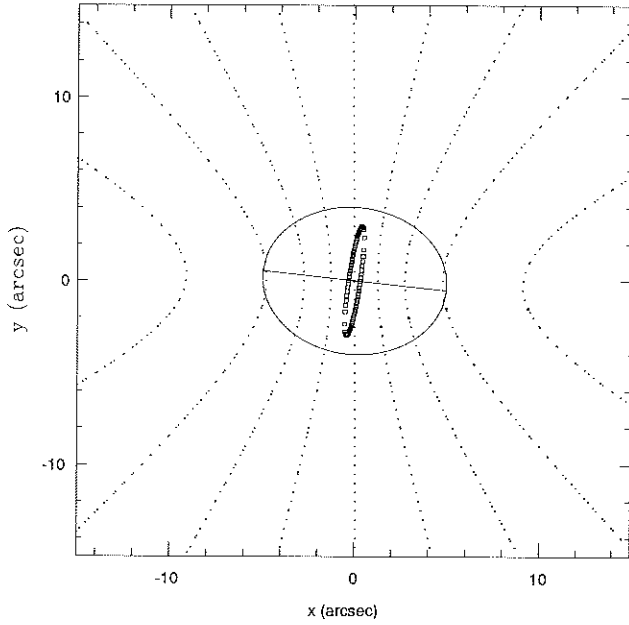
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 80.0$, $\theta= 37.0$
Apparent axial ratio = 0.80, $pa= 83.9$, kinematic misalignment =45.0



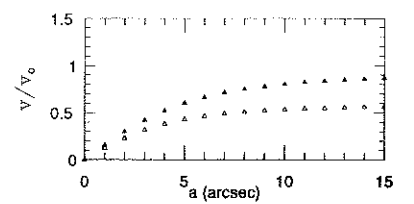
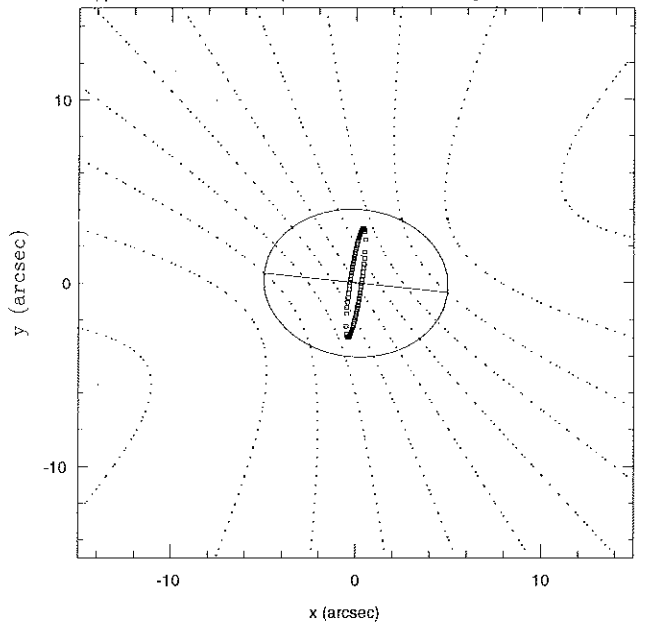
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 80.0$, $\theta= 37.0$
Apparent axial ratio = 0.80, $pa= 83.9$, kinematic misalignment =90.0



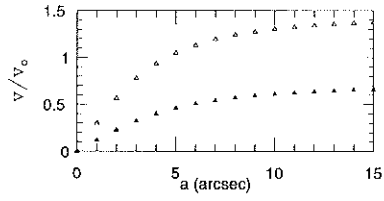
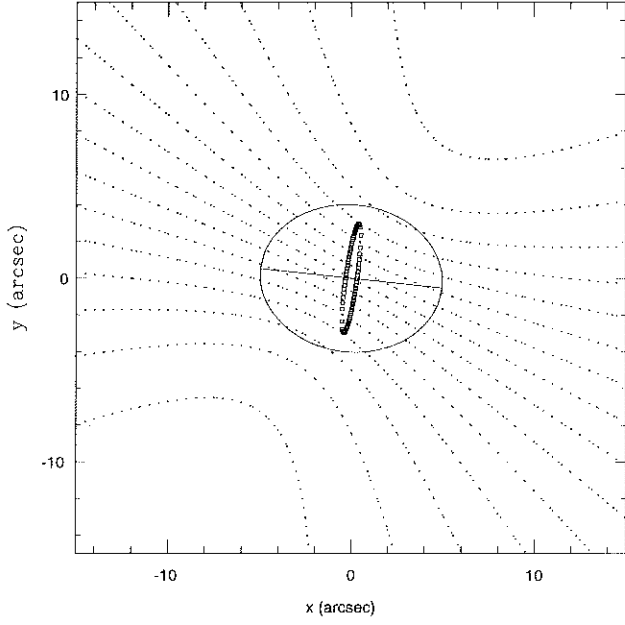
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 100.0$, $\theta= 37.0$
Apparent axial ratio = 0.80, $pa= 96.1$, kinematic misalignment = 0.0



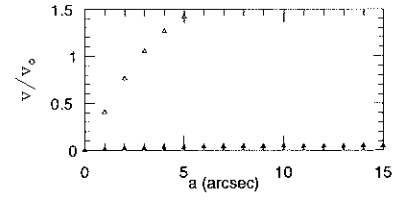
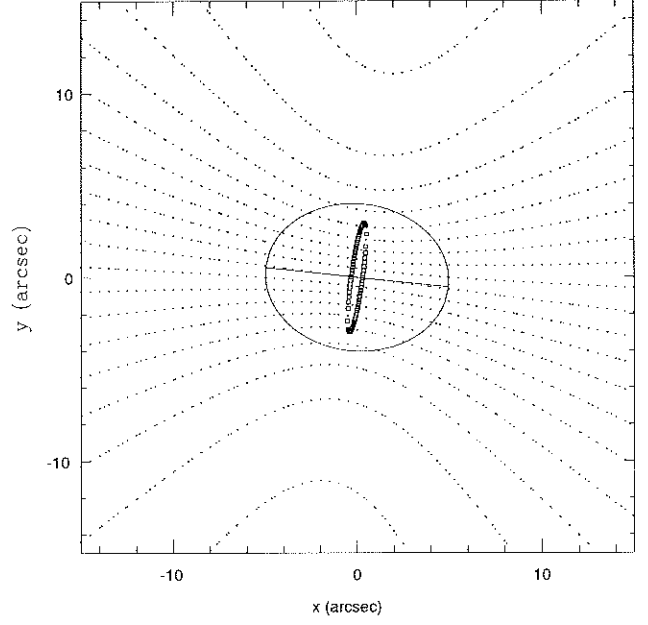
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 100.0$, $\theta= 37.0$
Apparent axial ratio = 0.80, $pa= 96.1$, kinematic misalignment =15.0



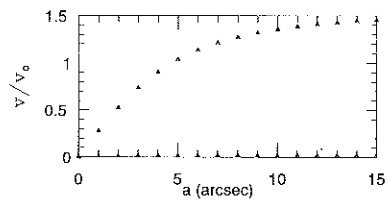
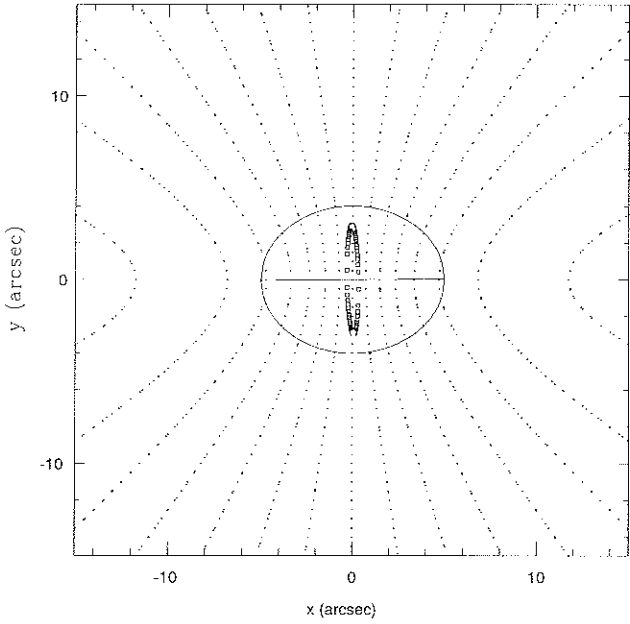
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=100.0$, $\theta=37.0$
Apparent axial ratio = 0.80, $pa=96.1$, kinematic misalignment =45.0



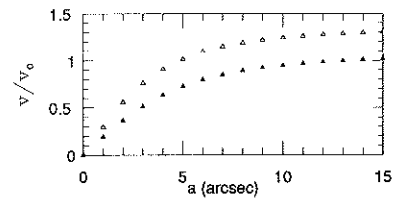
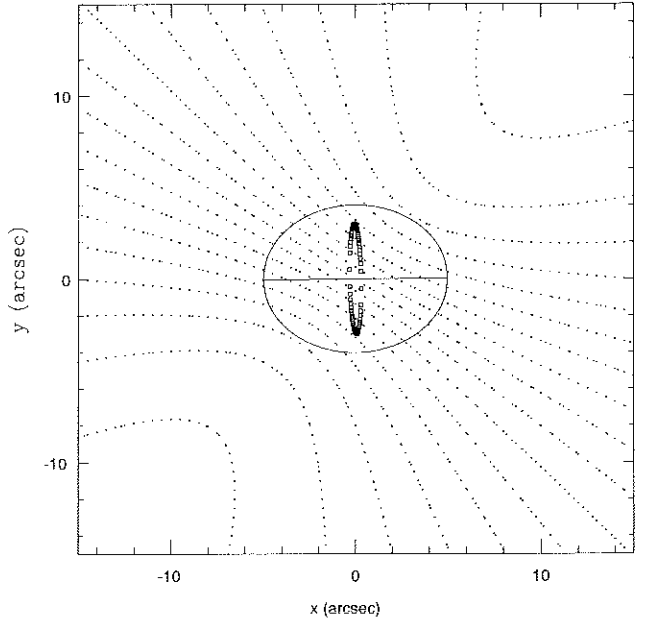
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=100.0$, $\theta=37.0$
Apparent axial ratio = 0.80, $pa=96.1$, kinematic misalignment =90.0



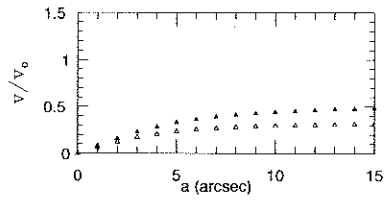
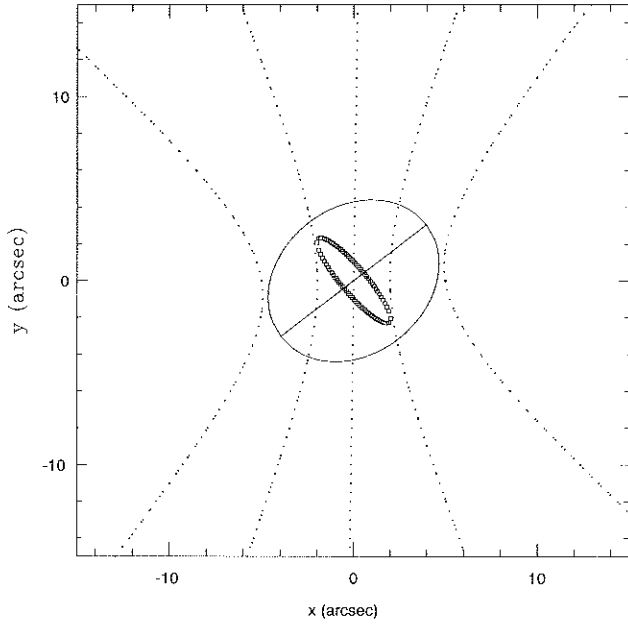
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=84.0$, $\theta=80.0$
Apparent axial ratio = 0.80, $pa=89.4$, kinematic misalignment = 0.0



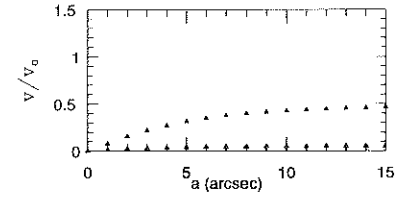
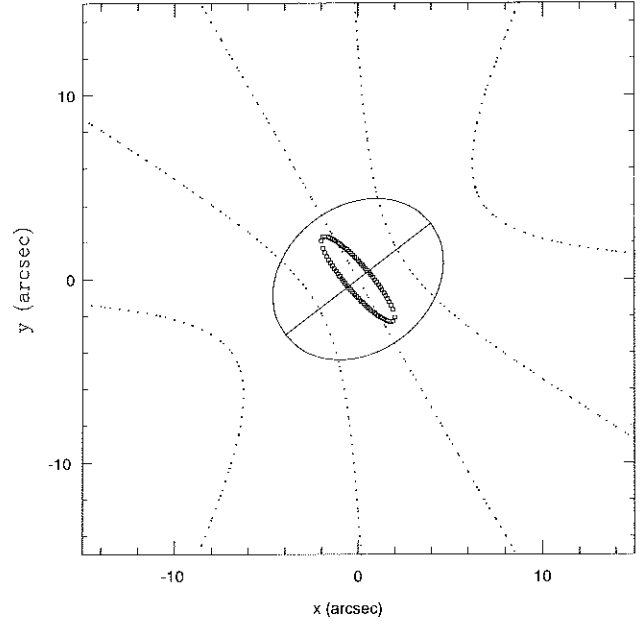
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=84.0$, $\theta=80.0$
Apparent axial ratio = 0.80, $pa=89.4$, kinematic misalignment =45.0



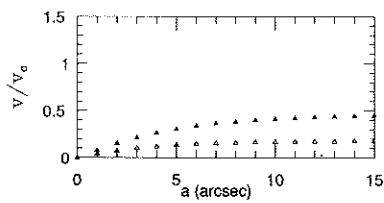
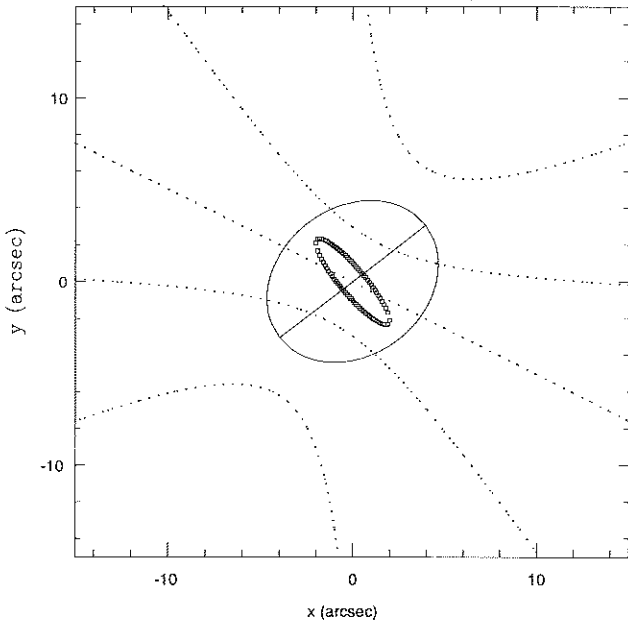
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 48.0$, $\theta = 20.0$
 Apparent axial ratio = 0.80, $pa = 52.4$, kinematic misalignment = 0.0



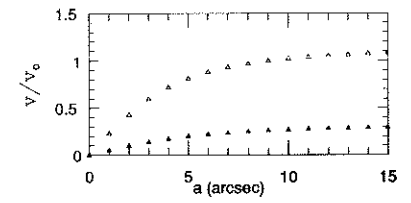
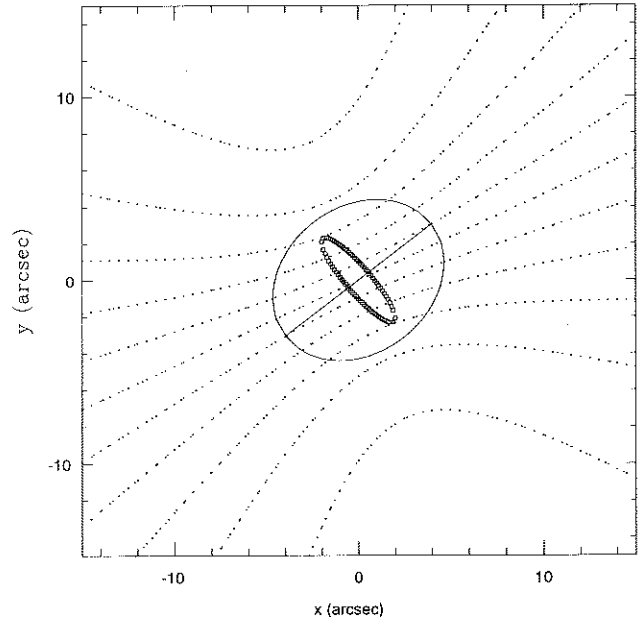
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 48.0$, $\theta = 20.0$
 Apparent axial ratio = 0.80, $pa = 52.4$, kinematic misalignment = 8.0



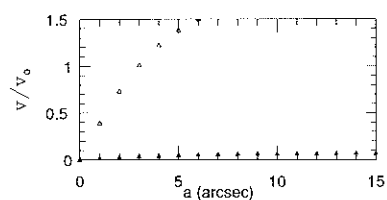
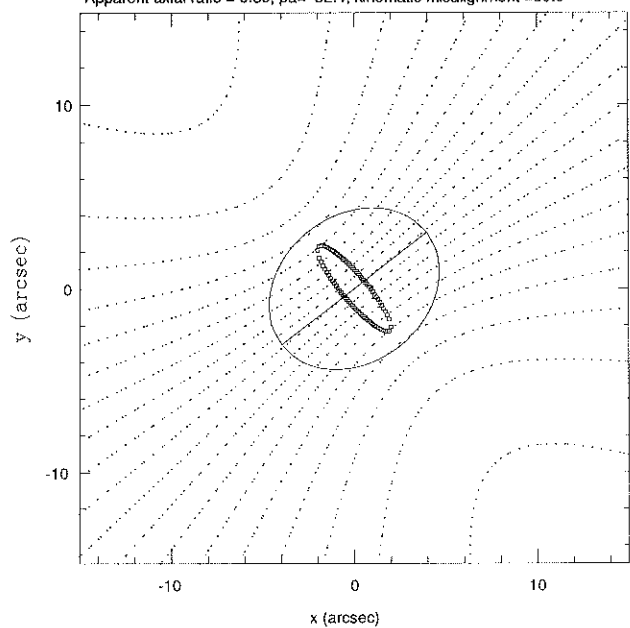
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 48.0$, $\theta = 20.0$
 Apparent axial ratio = 0.80, $pa = 52.4$, kinematic misalignment = 15.0



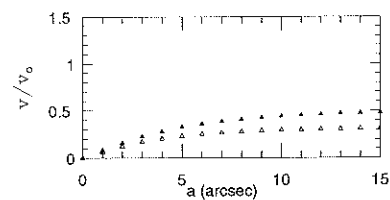
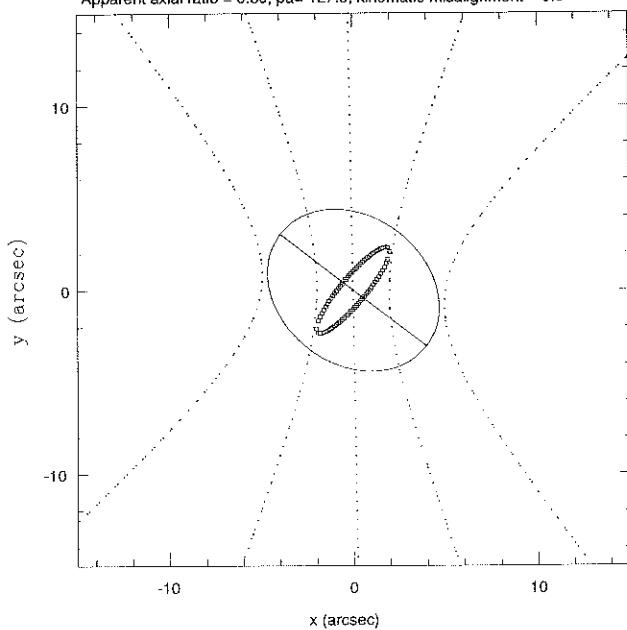
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 48.0$, $\theta = 20.0$
 Apparent axial ratio = 0.80, $pa = 52.4$, kinematic misalignment = 45.0



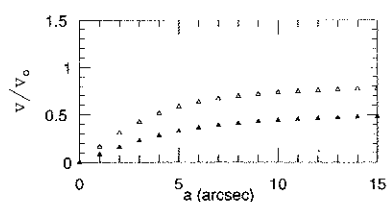
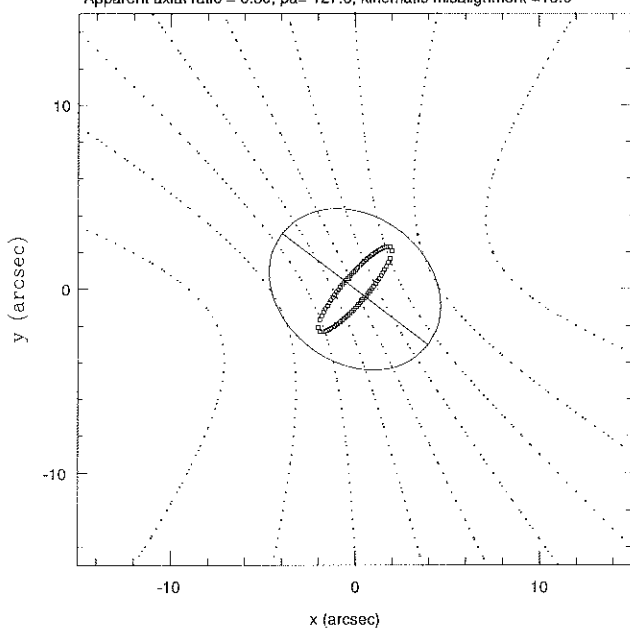
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 48.0$, $\theta= 20.0$
 Apparent axial ratio = 0.80, $pa= 52.4$, kinematic misalignment =90.0



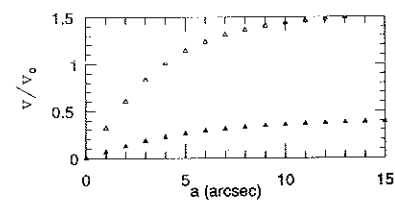
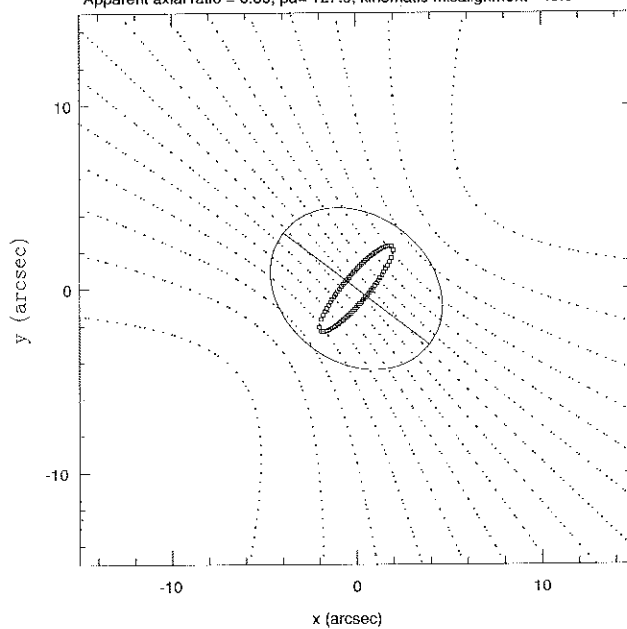
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 132.0$, $\theta= 20.0$
 Apparent axial ratio = 0.80, $pa= 127.6$, kinematic misalignment = 0.0



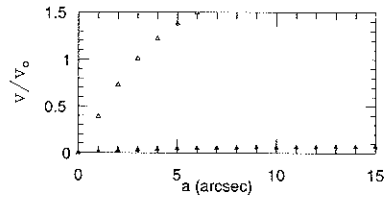
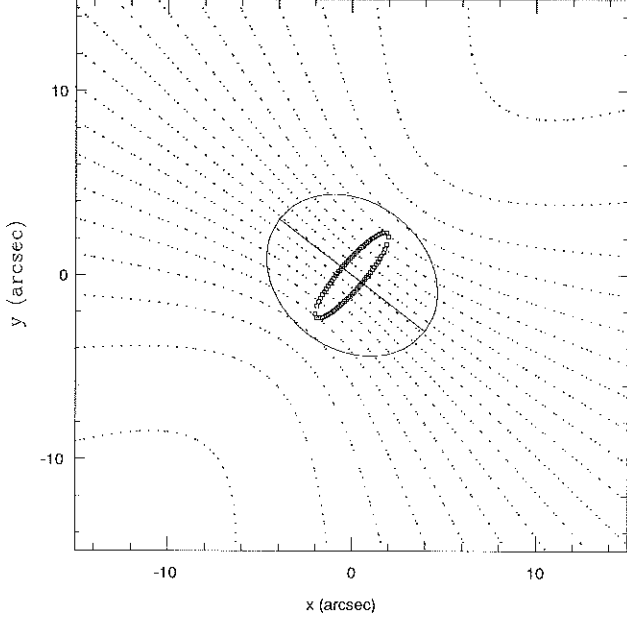
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 132.0$, $\theta= 20.0$
 Apparent axial ratio = 0.80, $pa= 127.6$, kinematic misalignment =15.0



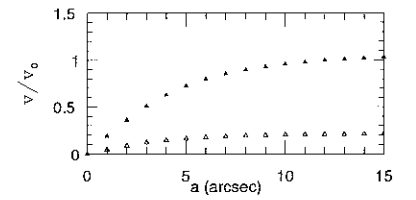
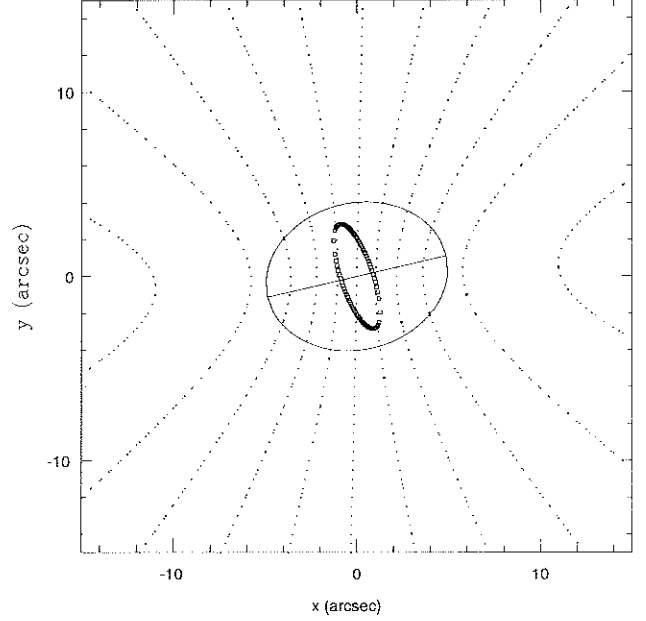
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 132.0$, $\theta= 20.0$
 Apparent axial ratio = 0.80, $pa= 127.6$, kinematic misalignment =45.0



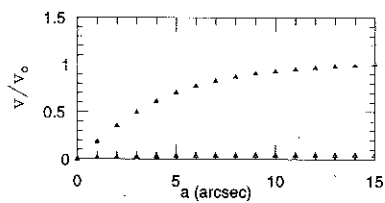
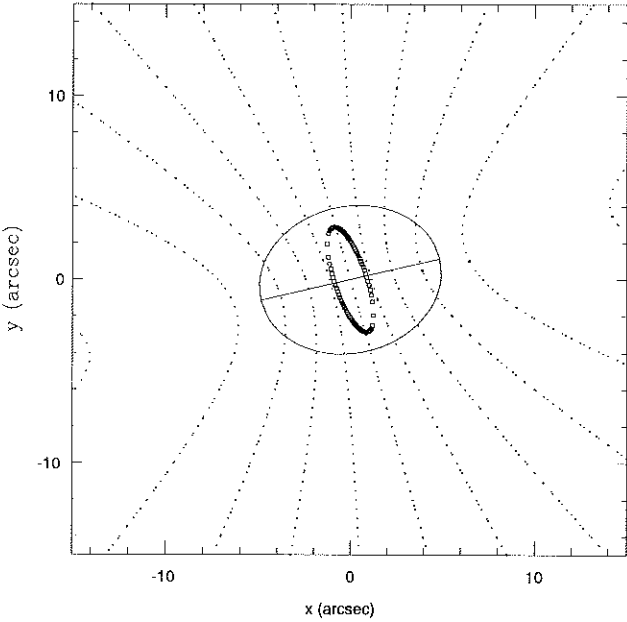
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 132.0$, $\theta = 20.0$
 Apparent axial ratio = 0.80, $pa = 127.6$, kinematic misalignment = 90.0



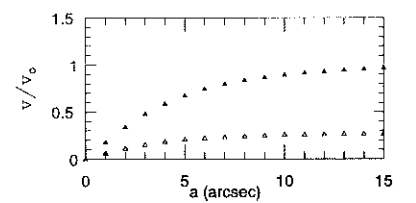
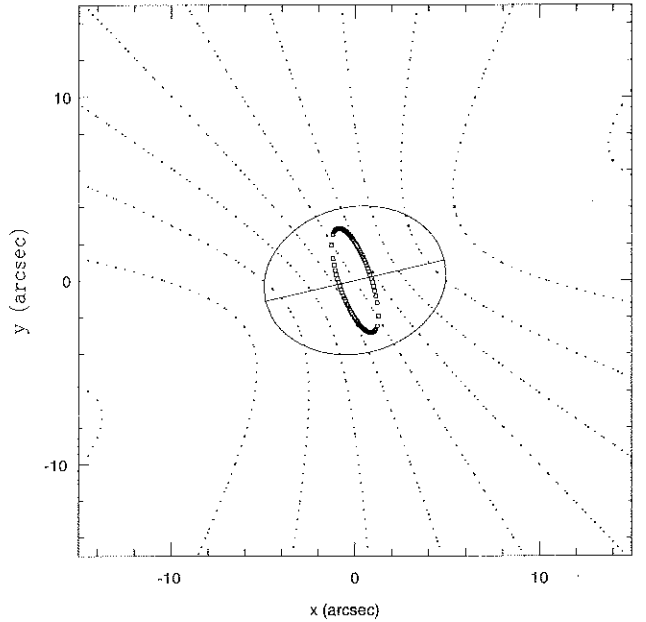
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi = 65.0$, $\theta = 44.0$
 Apparent axial ratio = 0.80, $pa = 77.0$, kinematic misalignment = 0.0



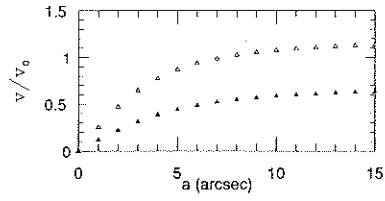
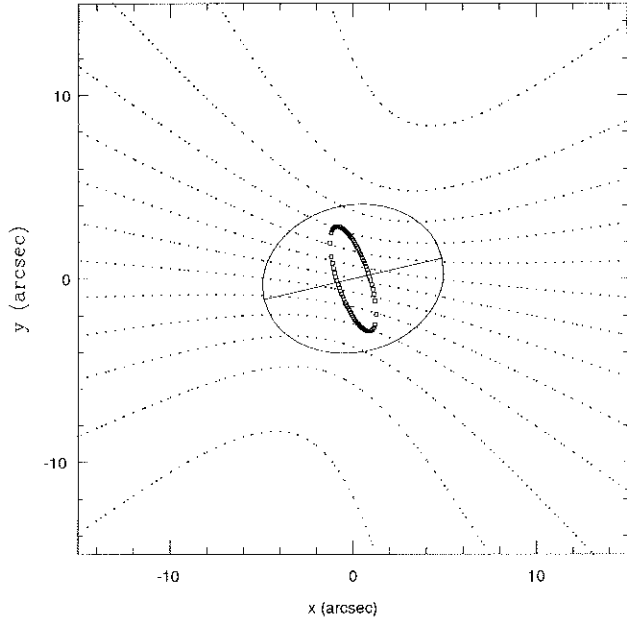
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi = 65.0$, $\theta = 44.0$
 Apparent axial ratio = 0.80, $pa = 77.0$, kinematic misalignment = 8.0



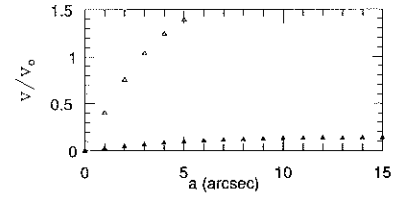
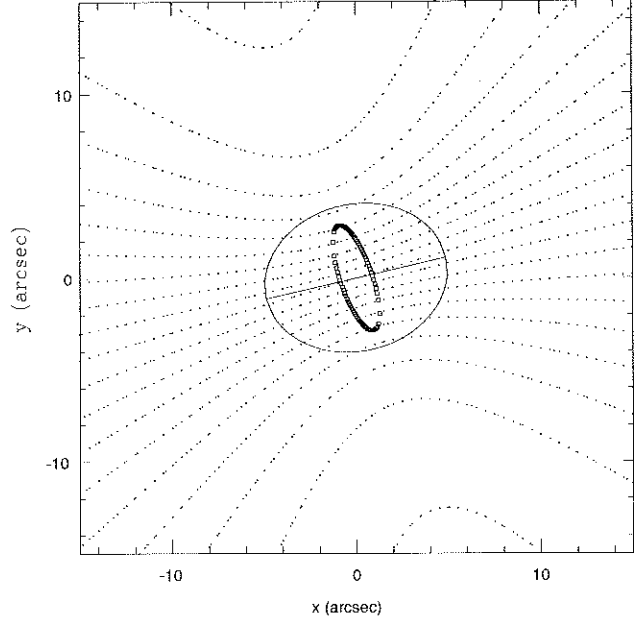
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi = 65.0$, $\theta = 44.0$
 Apparent axial ratio = 0.80, $pa = 77.0$, kinematic misalignment = 15.0



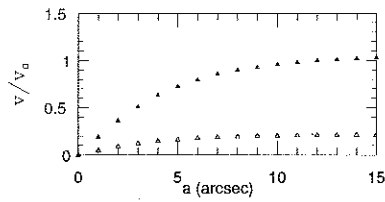
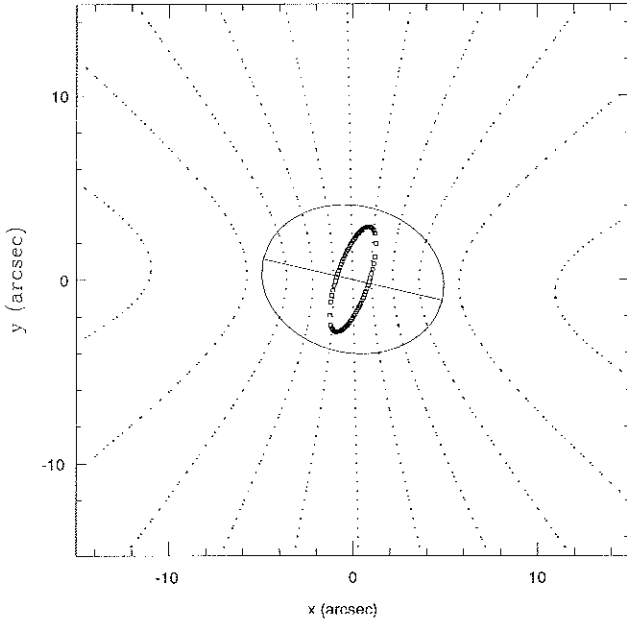
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi = 65.0$, $\theta = 44.0$
 Apparent axial ratio = 0.80, $pa = 77.0$, kinematic misalignment = 45.0



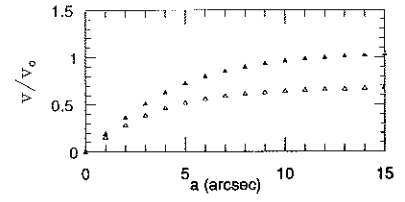
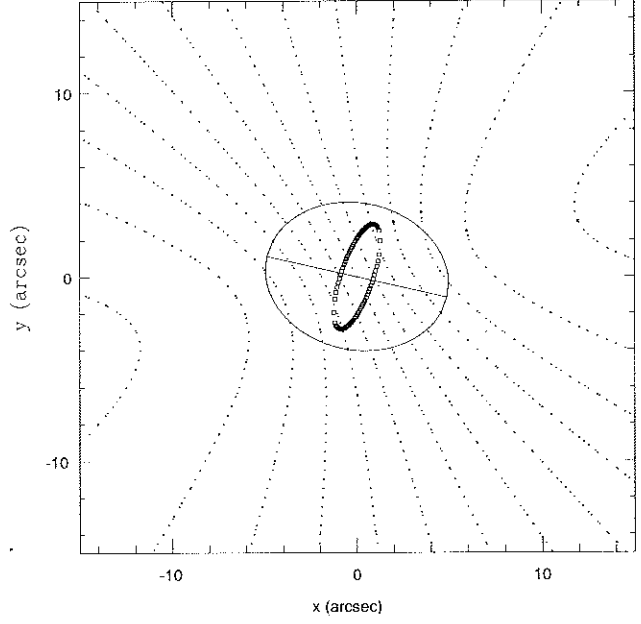
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi = 65.0$, $\theta = 44.0$
 Apparent axial ratio = 0.80, $pa = 77.0$, kinematic misalignment = 90.0



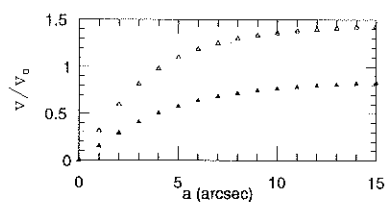
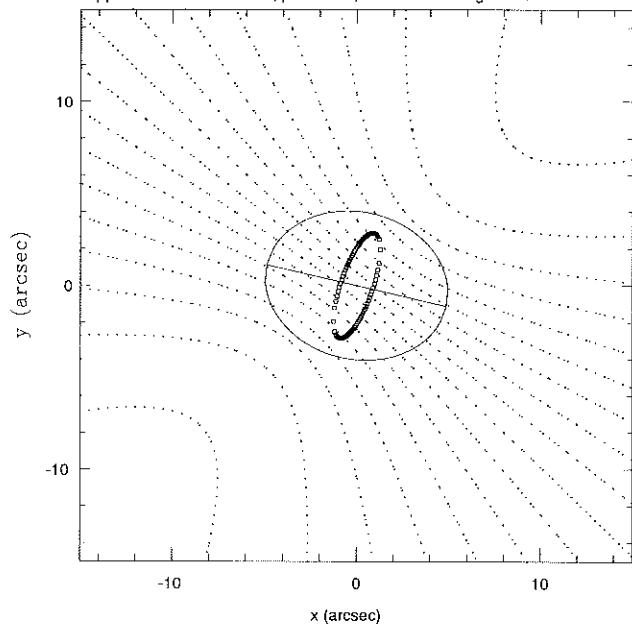
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi = 115.0$, $\theta = 44.0$
 Apparent axial ratio = 0.80, $pa = 103.0$, kinematic misalignment = 0.0



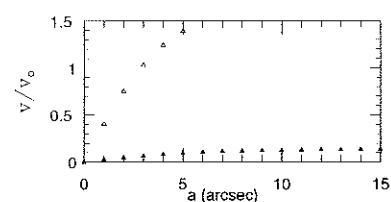
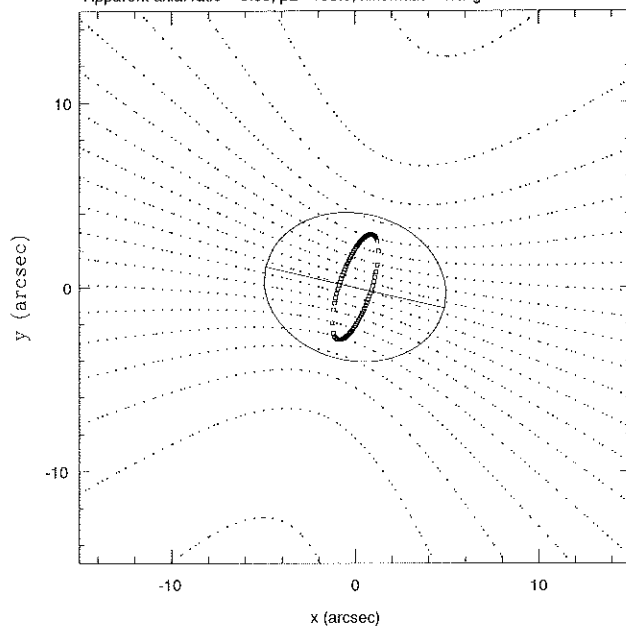
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi = 115.0$, $\theta = 44.0$
 Apparent axial ratio = 0.80, $pa = 103.0$, kinematic misalignment = 15.0



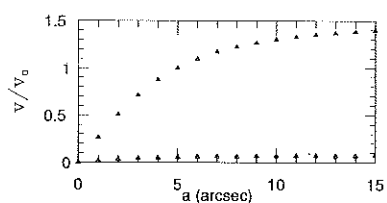
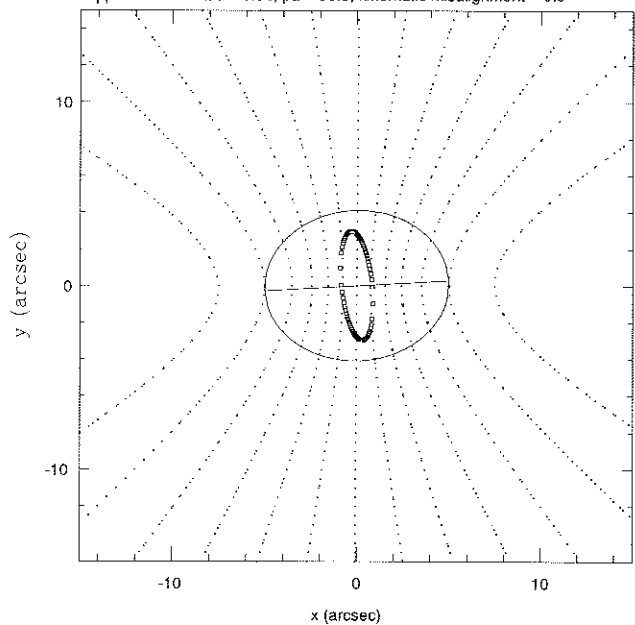
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=115.0$, $\theta=44.0$
Apparent axial ratio = 0.80, $pa=103.0$, kinematic misalignment =45.0



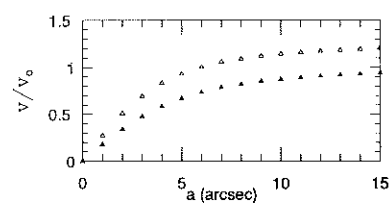
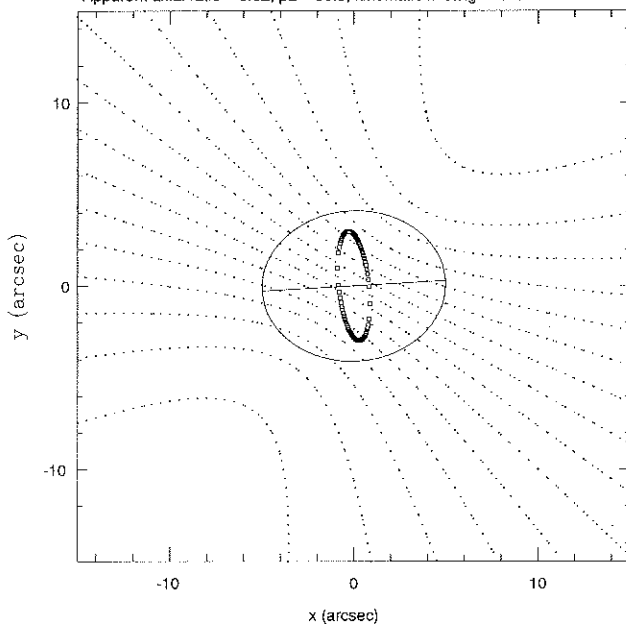
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=115.0$, $\theta=44.0$
Apparent axial ratio = 0.80, $pa=103.0$, kinematic misalignment =90.0



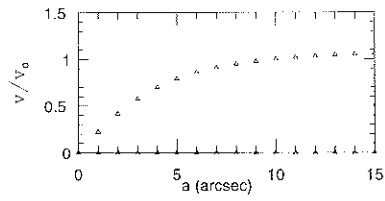
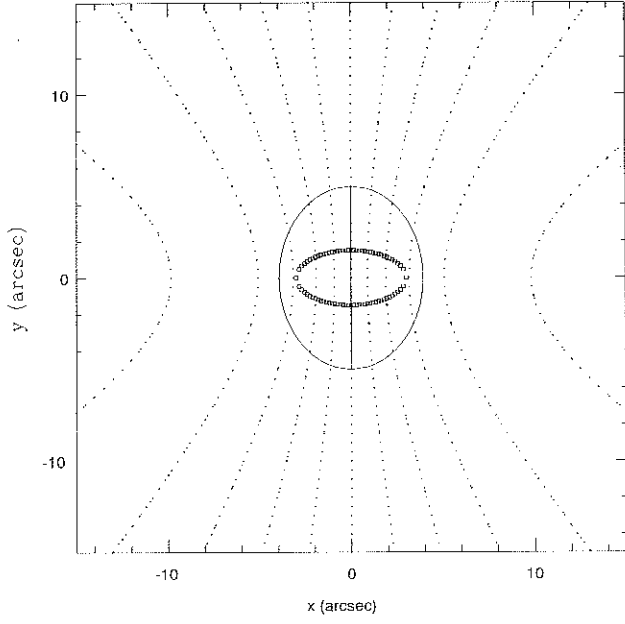
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=73.0$, $\theta=70.0$
Apparent axial ratio = 0.82, $pa=86.8$, kinematic misalignment = 0.0



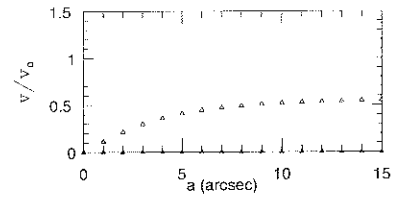
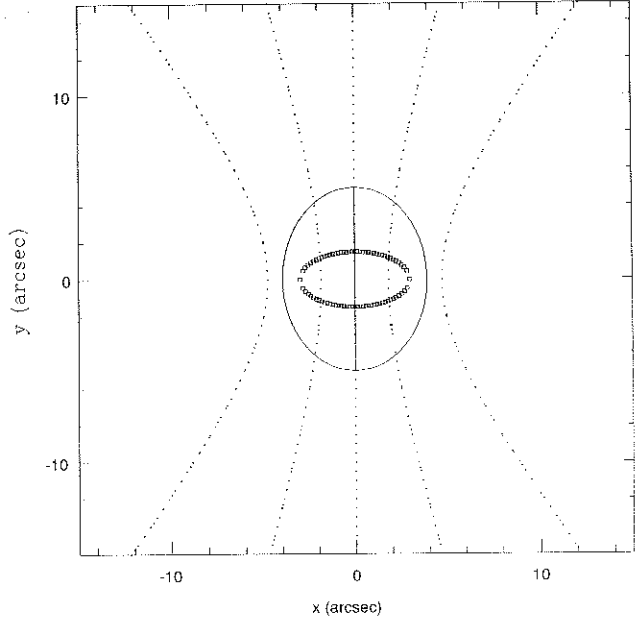
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=73.0$, $\theta=70.0$
Apparent axial ratio = 0.82, $pa=86.8$, kinematic misalignment =45.0



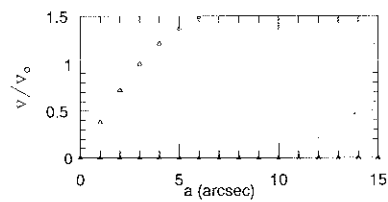
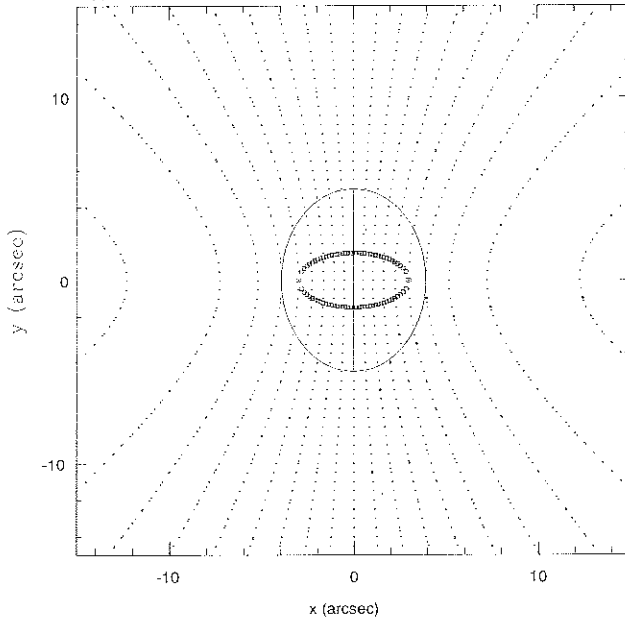
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 0.0$, $\theta = 30.0$
 Apparent axial ratio = 0.79, $pa = 0.0$, kinematic misalignment = 0.0



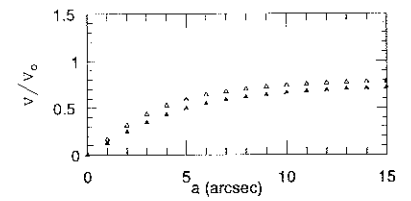
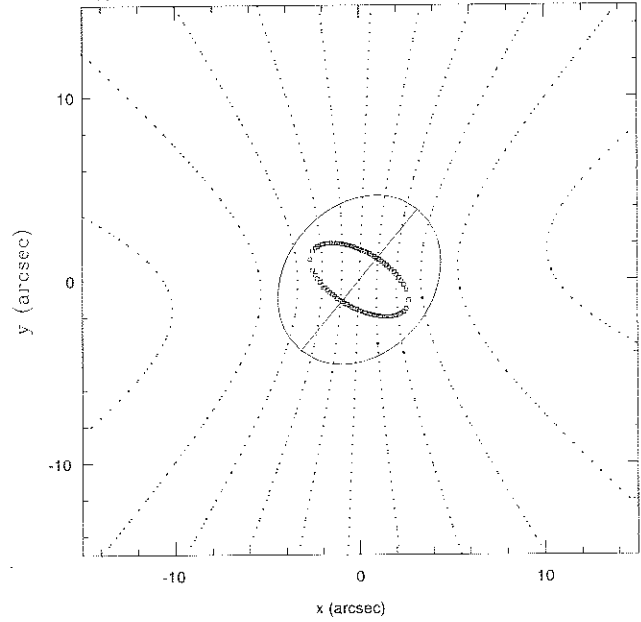
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 0.0$, $\theta = 30.0$
 Apparent axial ratio = 0.79, $pa = 0.0$, kinematic misalignment = 45.0



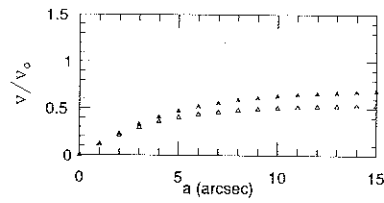
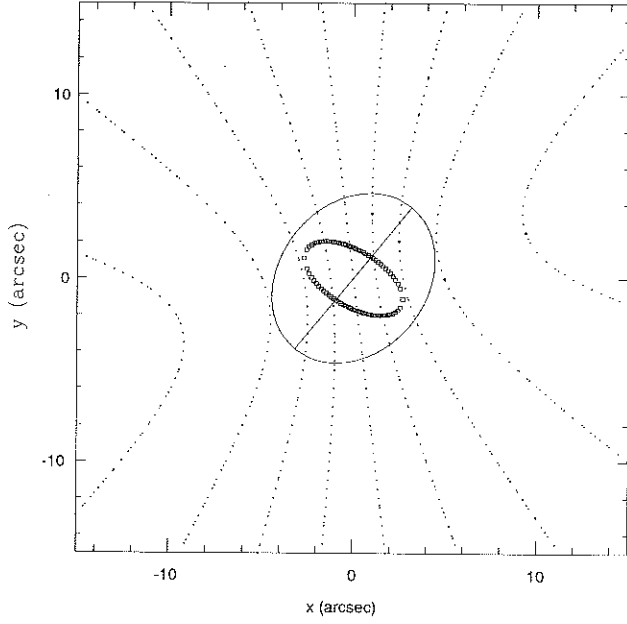
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 0.0$, $\theta = 30.0$
 Apparent axial ratio = 0.79, $pa = 0.0$, kinematic misalignment = 90.0



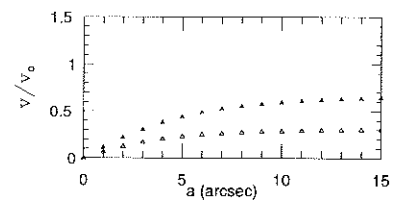
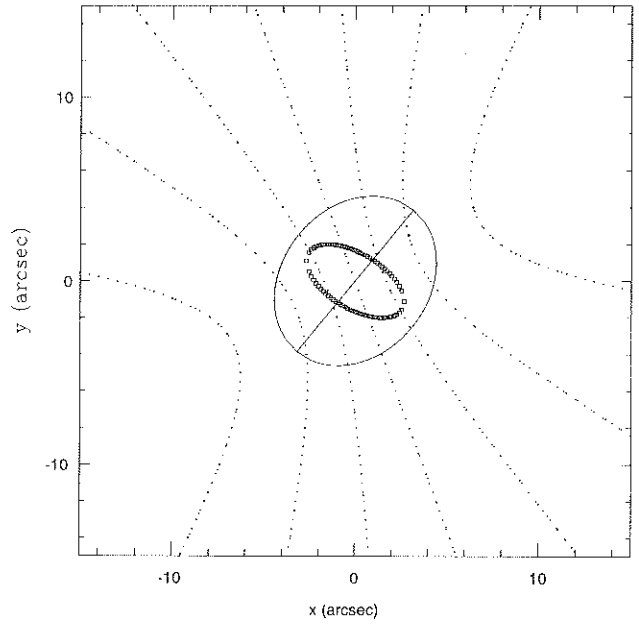
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 26.5$, $\theta = 34.0$
 Apparent axial ratio = 0.80, $pa = 39.5$, kinematic misalignment = 0.0



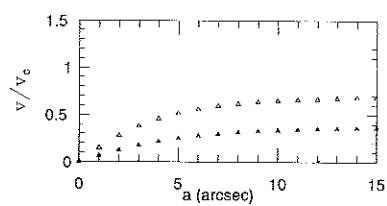
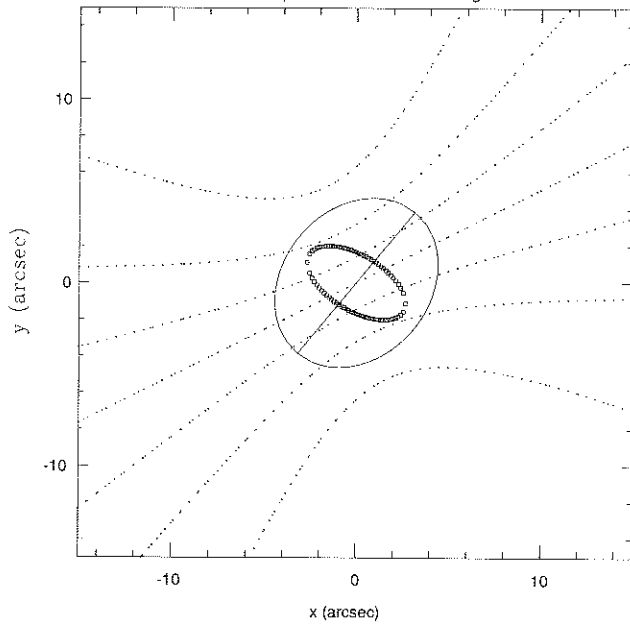
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 26.5^\circ$, $\theta = 34.0^\circ$
Apparent axial ratio = 0.80, $pa = 39.5$, kinematic misalignment = 8.0



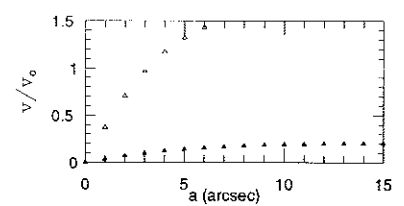
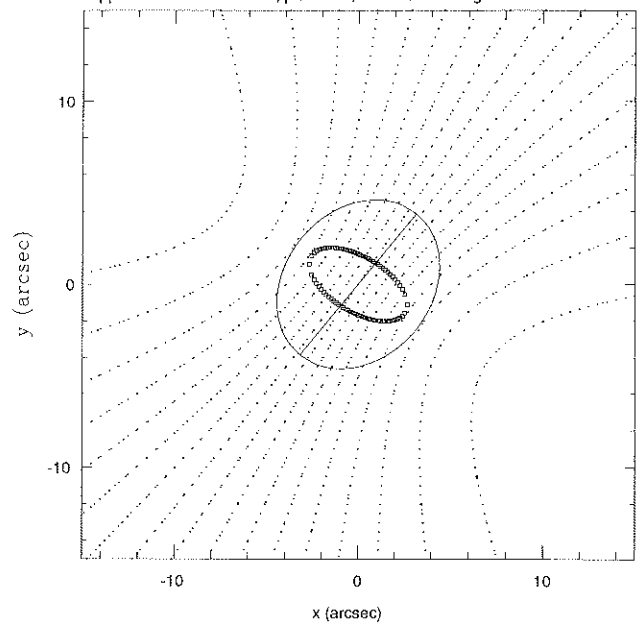
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 26.5^\circ$, $\theta = 34.0^\circ$
Apparent axial ratio = 0.80, $pa = 39.5$, kinematic misalignment = 15.0

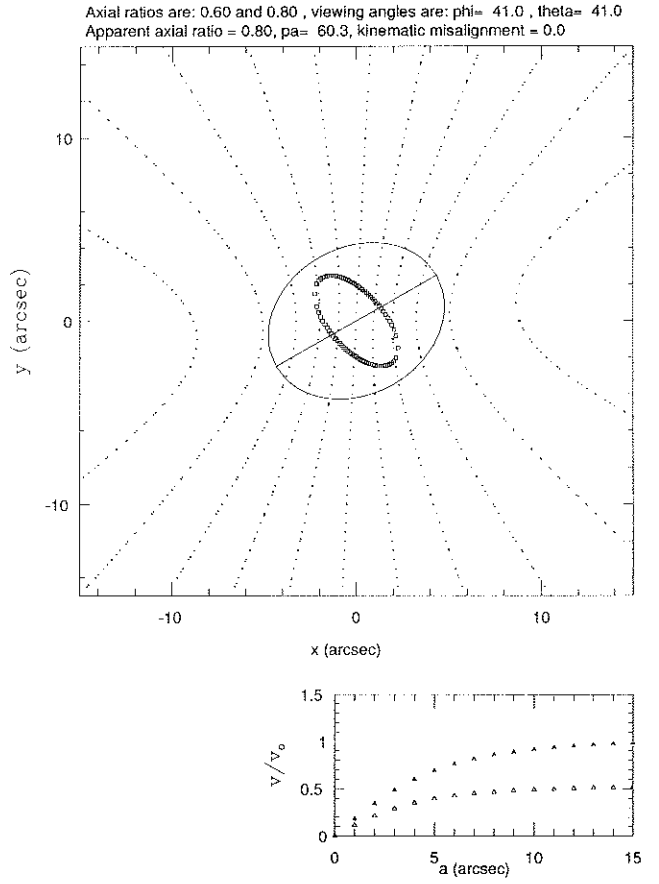
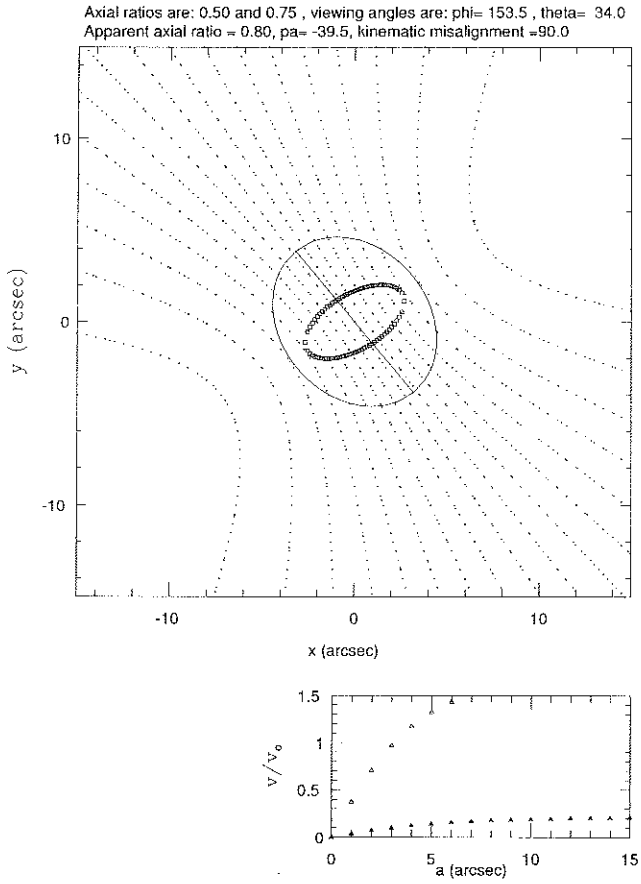
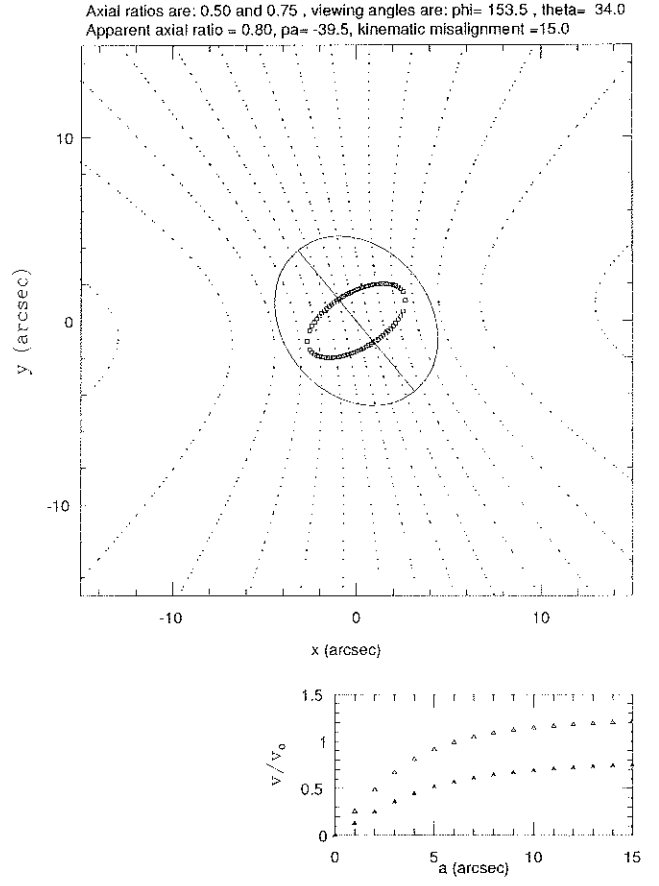
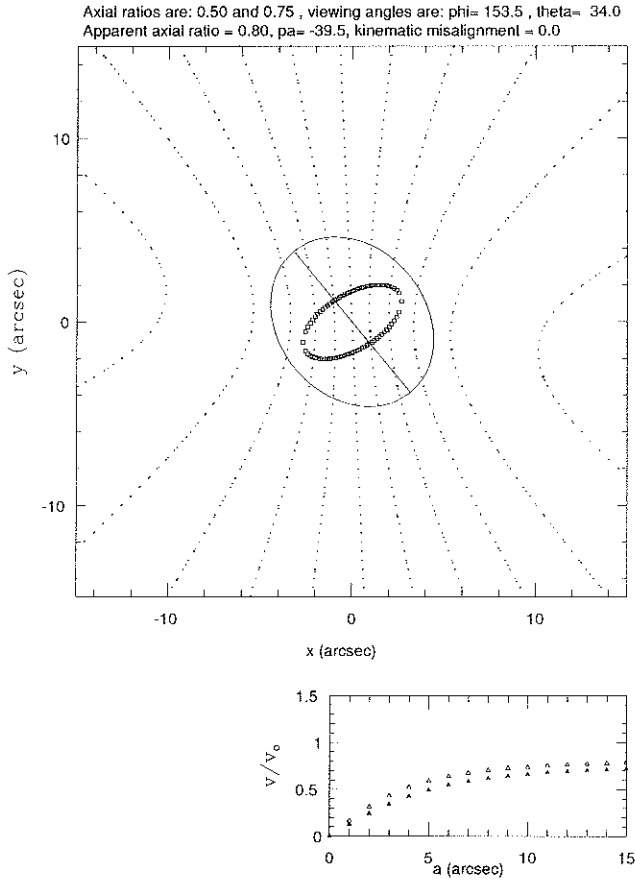


Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 26.5^\circ$, $\theta = 34.0^\circ$
Apparent axial ratio = 0.80, $pa = 39.5$, kinematic misalignment = 45.0

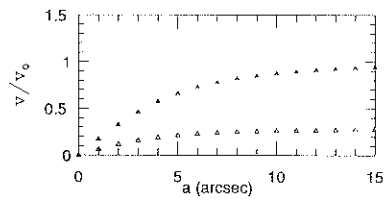
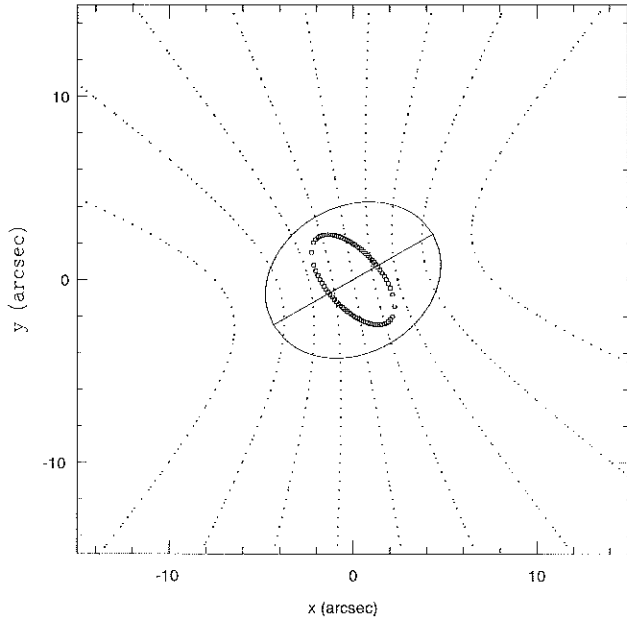


Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 26.5^\circ$, $\theta = 34.0^\circ$
Apparent axial ratio = 0.80, $pa = 39.5$, kinematic misalignment = 90.0

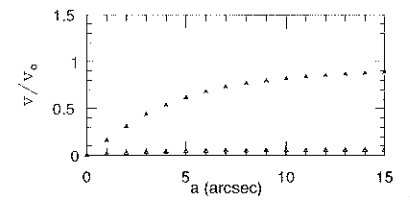
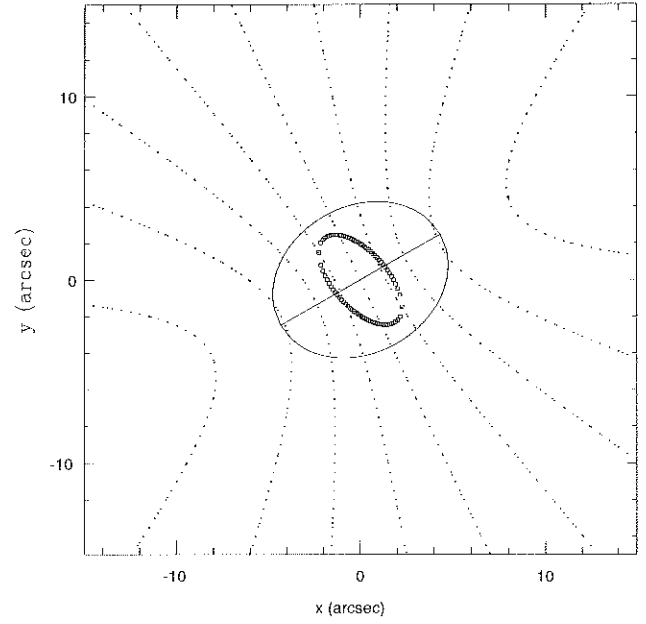




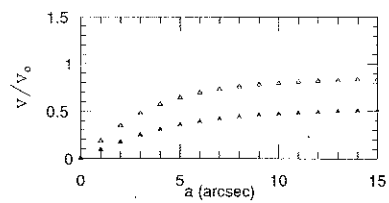
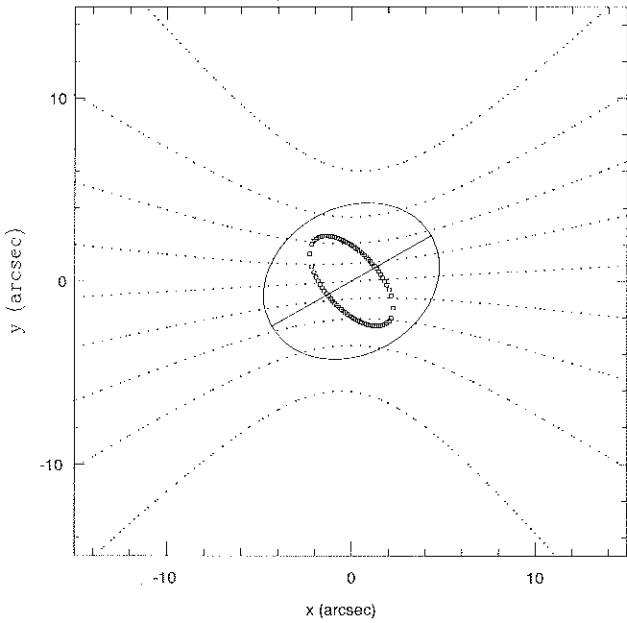
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 41.0$, $\theta= 41.0$
Apparent axial ratio = 0.80, $pa= 60.3$, kinematic misalignment = 8.0



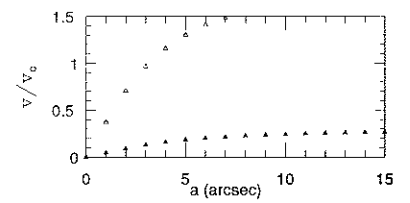
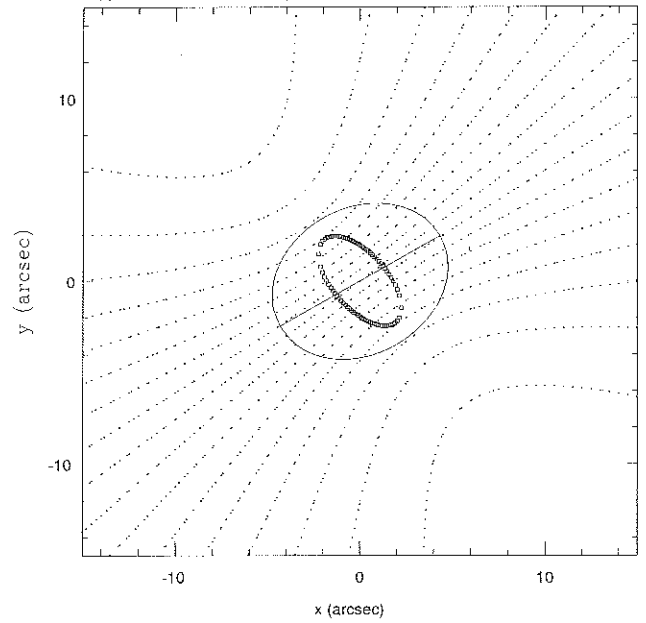
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 41.0$, $\theta= 41.0$
Apparent axial ratio = 0.80, $pa= 60.3$, kinematic misalignment = 15.0



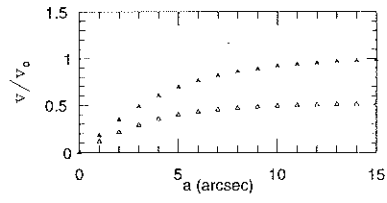
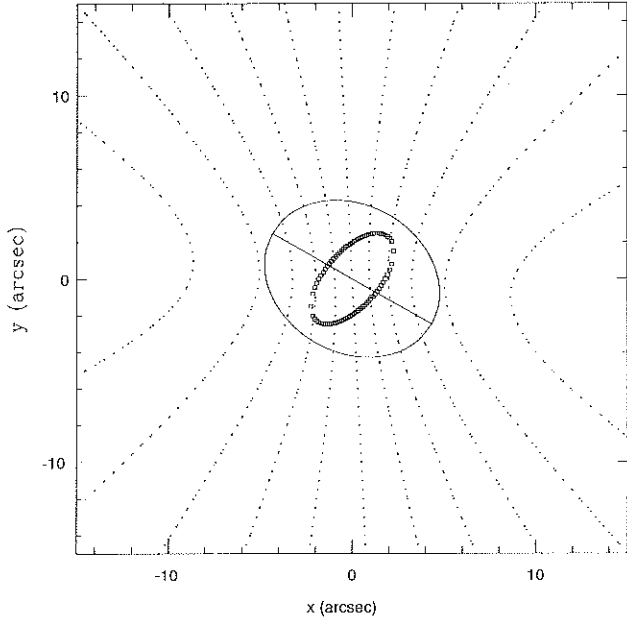
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 41.0$, $\theta= 41.0$
Apparent axial ratio = 0.80, $pa= 60.3$, kinematic misalignment = 45.0



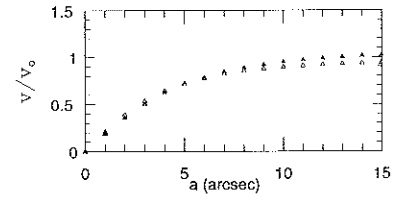
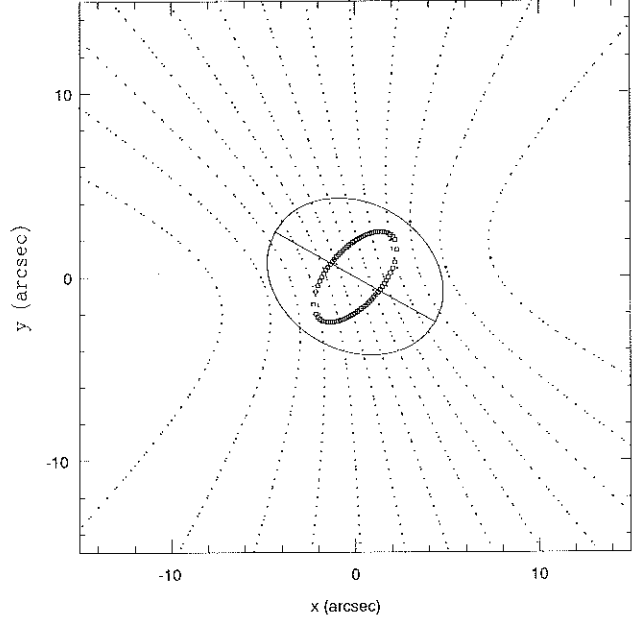
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 41.0$, $\theta= 41.0$
Apparent axial ratio = 0.80, $pa= 60.3$, kinematic misalignment = 90.0



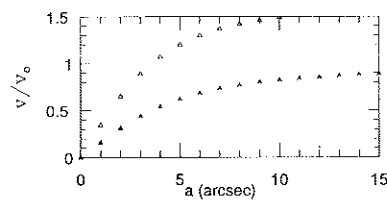
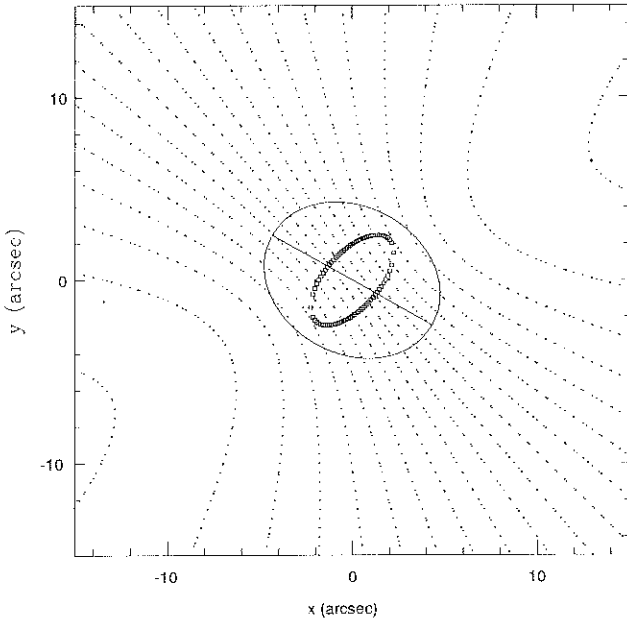
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=139.0$, $\theta=41.0$
 Apparent axial ratio = 0.80, $pa=119.7$, kinematic misalignment = 0.0



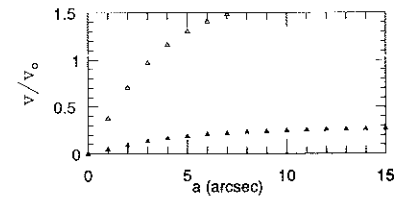
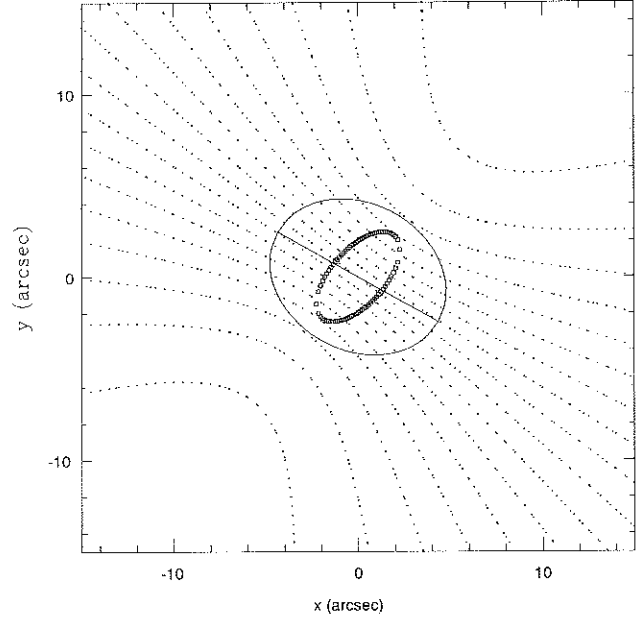
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=139.0$, $\theta=41.0$
 Apparent axial ratio = 0.80, $pa=119.7$, kinematic misalignment = 15.0



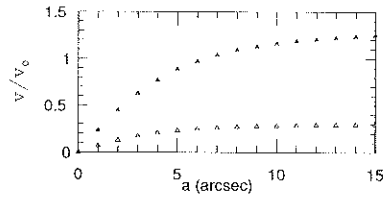
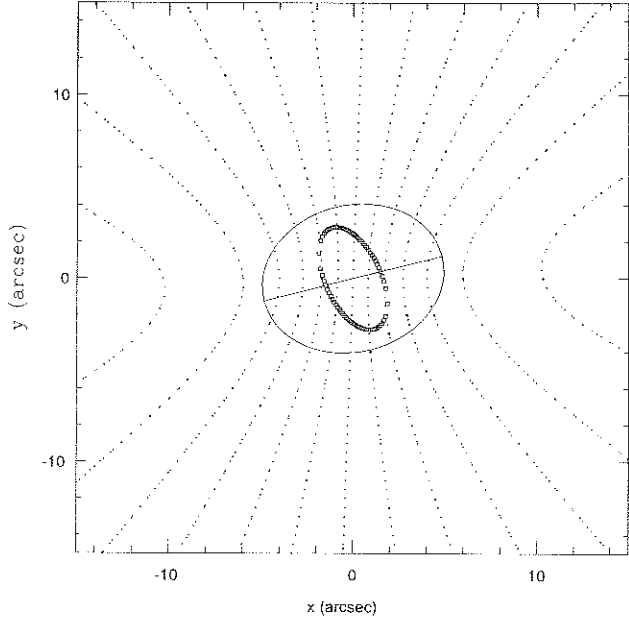
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=139.0$, $\theta=41.0$
 Apparent axial ratio = 0.80, $pa=119.7$, kinematic misalignment = 45.0



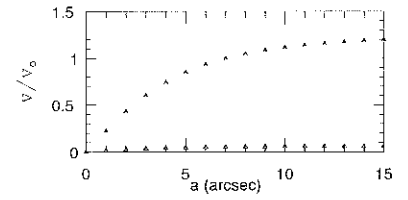
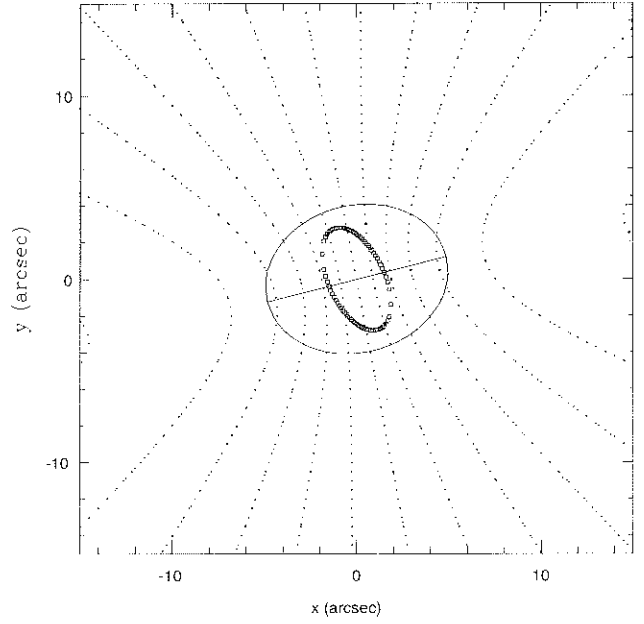
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=139.0$, $\theta=41.0$
 Apparent axial ratio = 0.80, $pa=119.7$, kinematic misalignment = 90.0



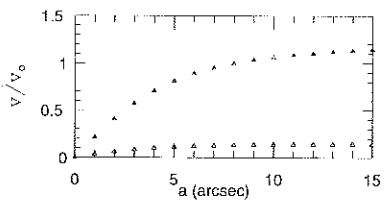
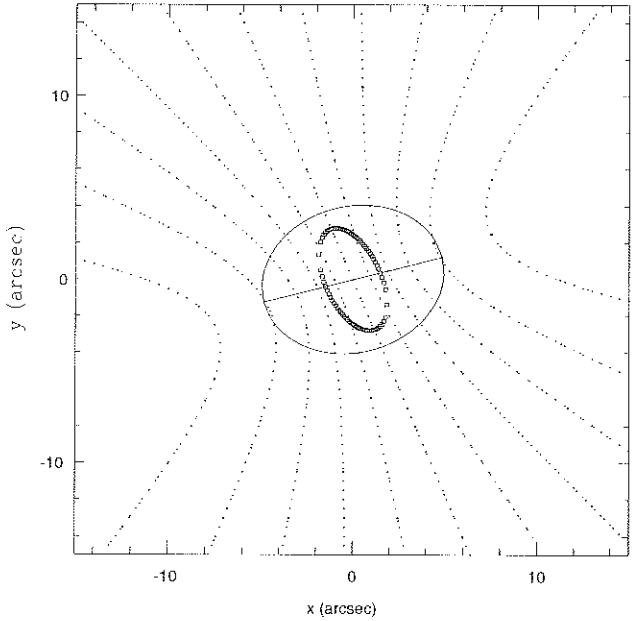
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 51.5$, $\theta= 54.5$
 Apparent axial ratio = 0.80, $pa= 75.7$, kinematic misalignment = 0.0



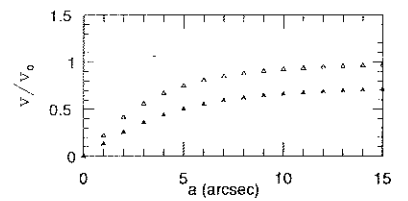
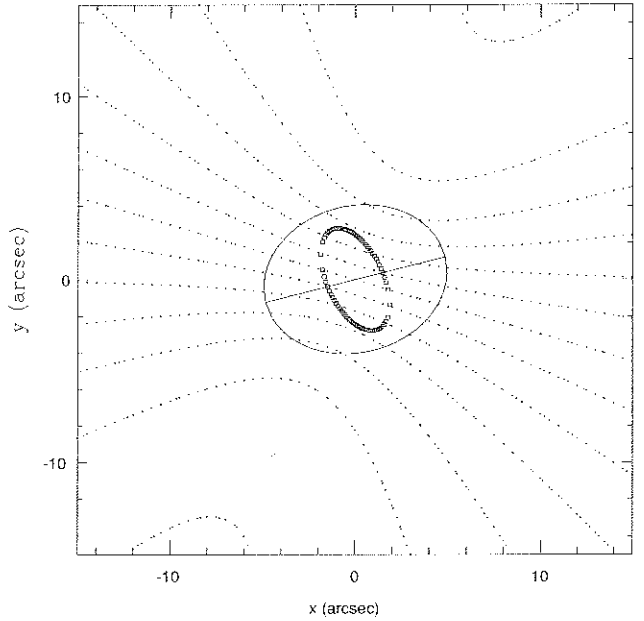
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 51.5$, $\theta= 54.5$
 Apparent axial ratio = 0.80, $pa= 75.7$, kinematic misalignment = 8.0



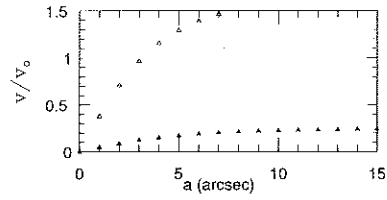
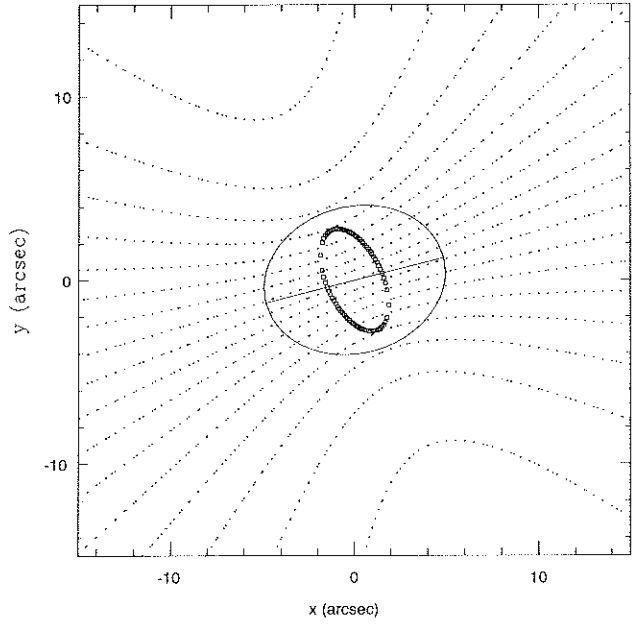
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 51.5$, $\theta= 54.5$
 Apparent axial ratio = 0.80, $pa= 75.7$, kinematic misalignment = 15.0



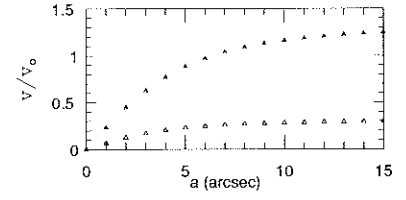
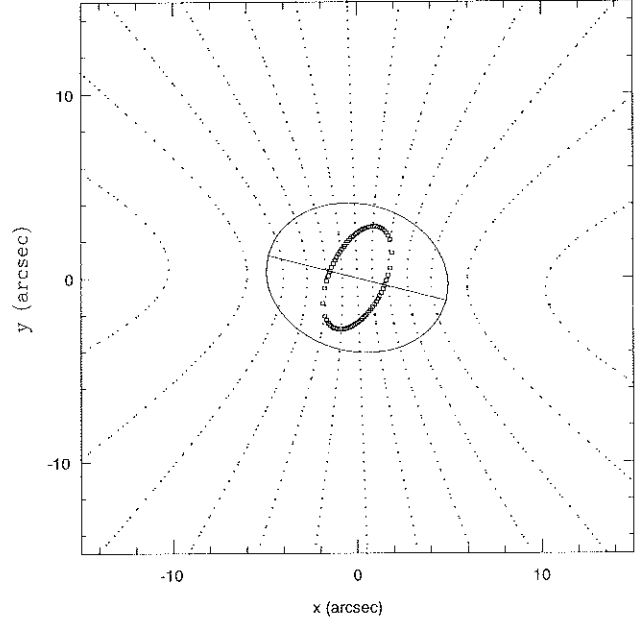
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 51.5$, $\theta= 54.5$
 Apparent axial ratio = 0.80, $pa= 75.7$, kinematic misalignment = 45.0



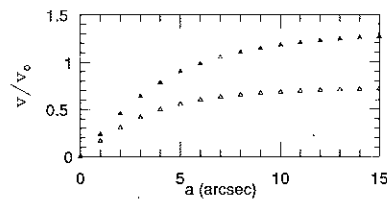
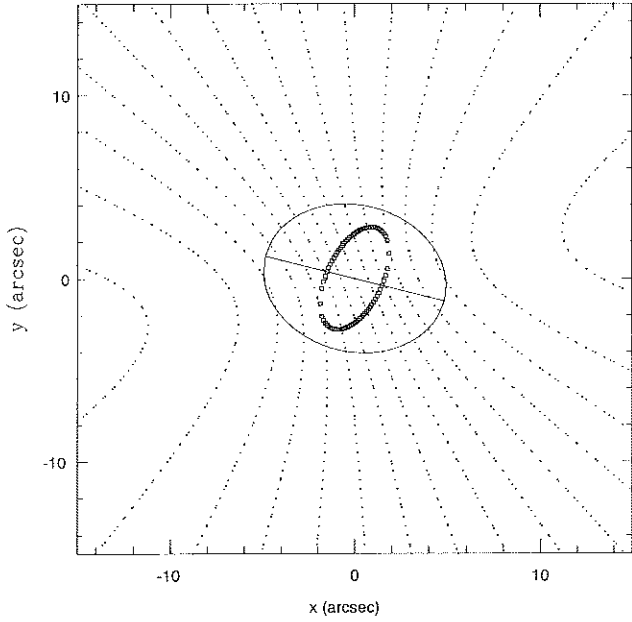
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 51.5$, $\theta= 54.5$
 Apparent axial ratio = 0.80, $pa= 75.7$, kinematic misalignment =90.0



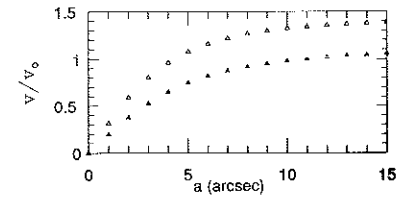
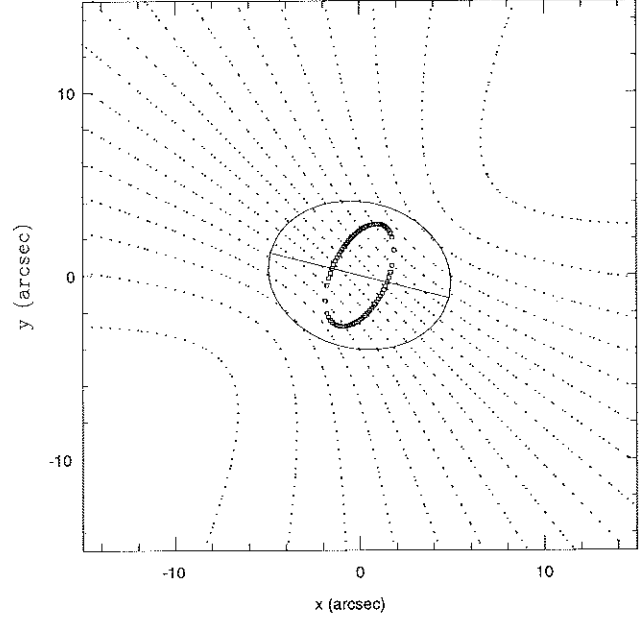
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 128.5$, $\theta= 54.5$
 Apparent axial ratio = 0.80, $pa= 104.3$, kinematic misalignment = 0.0



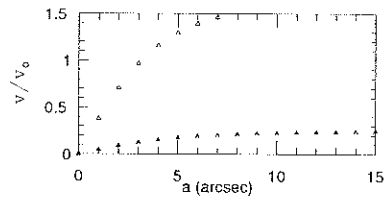
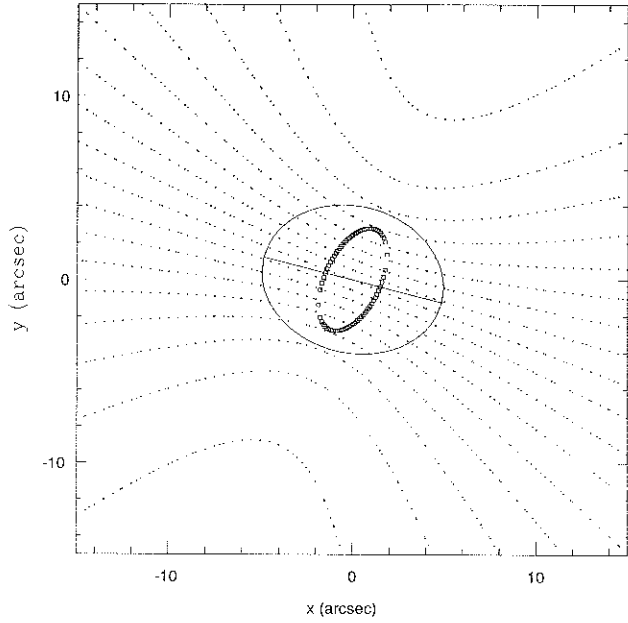
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 128.5$, $\theta= 54.5$
 Apparent axial ratio = 0.80, $pa= 104.3$, kinematic misalignment =15.0



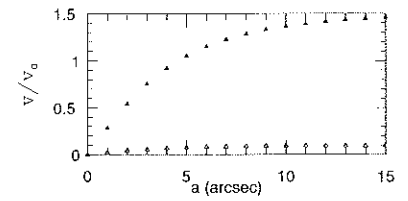
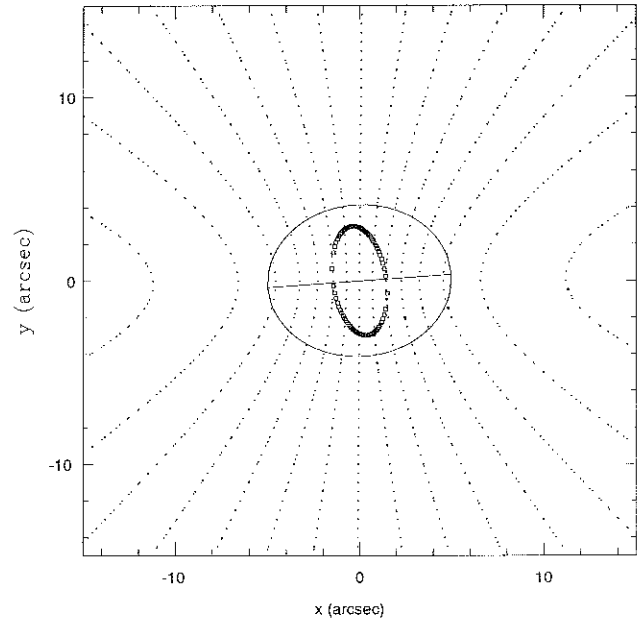
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 128.5$, $\theta= 54.5$
 Apparent axial ratio = 0.80, $pa= 104.3$, kinematic misalignment =45.0



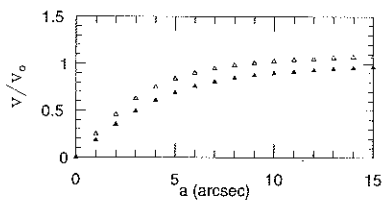
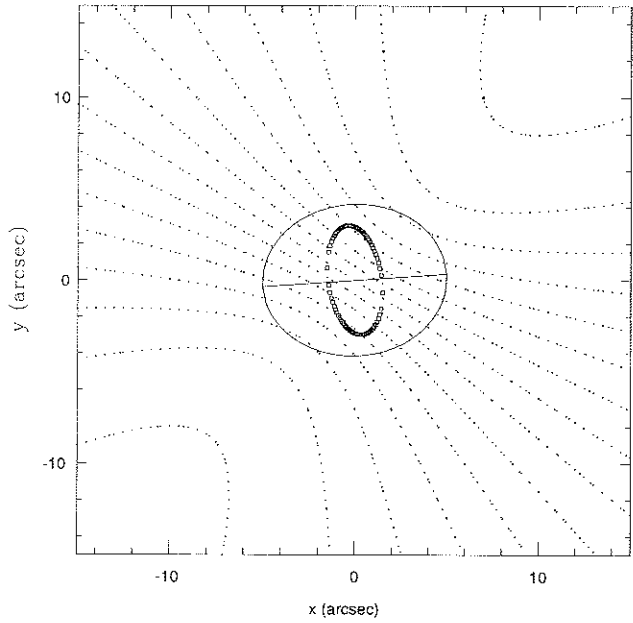
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=128.5$, $\theta=54.5$
Apparent axial ratio = 0.80, $pa=104.3$, kinematic misalignment = 90.0



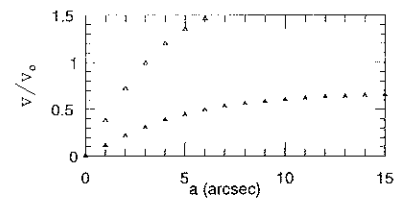
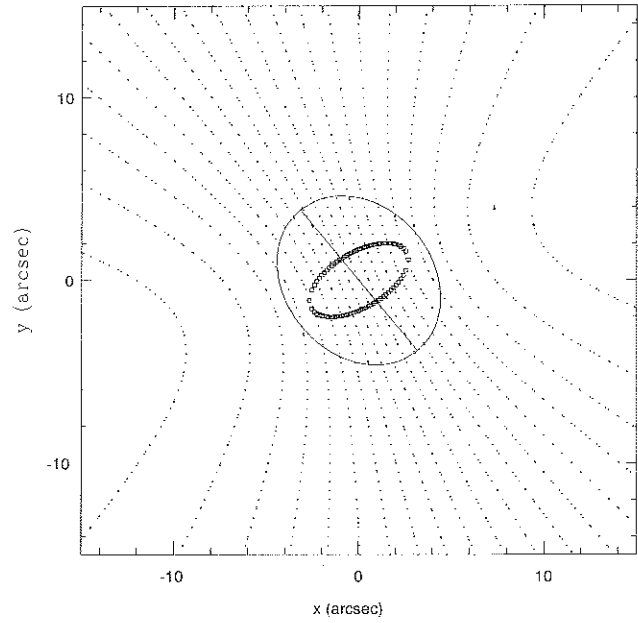
Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=60.0$, $\theta=75.0$
Apparent axial ratio = 0.83, $pa=85.9$, kinematic misalignment = 0.0



Axial ratios are: 0.80 and 0.90 , viewing angles are: $\phi=60.0$, $\theta=75.0$
Apparent axial ratio = 0.83, $pa=85.9$, kinematic misalignment = 45.0

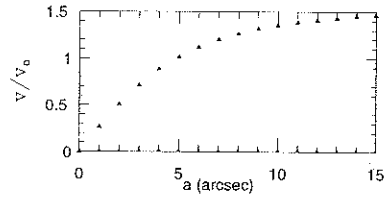
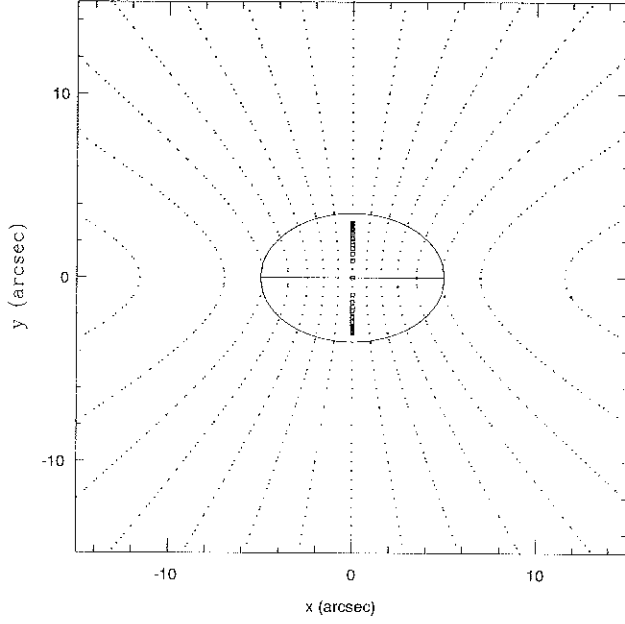


Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=153.5$, $\theta=34.0$
Apparent axial ratio = 0.80, $pa=-39.5$, kinematic misalignment = 45.0

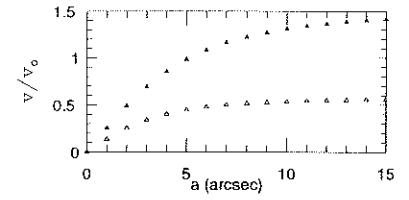
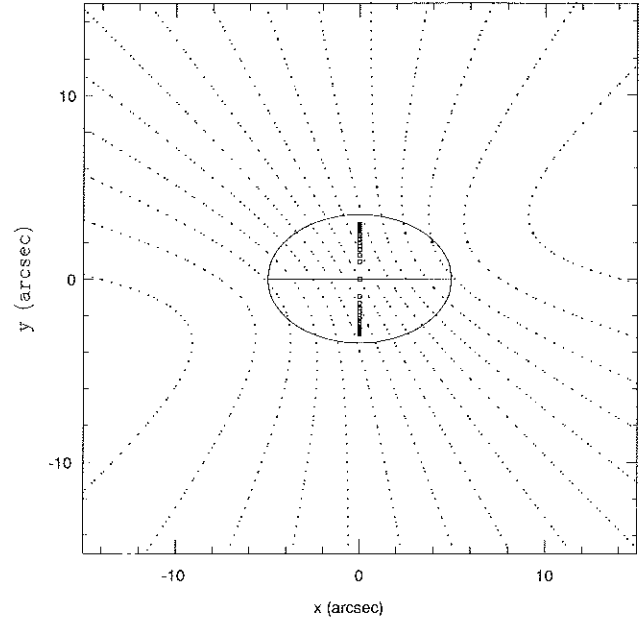


E3 GALAXIES

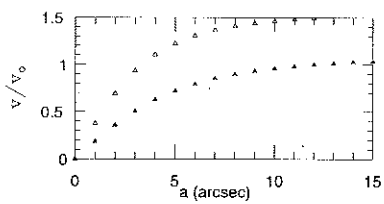
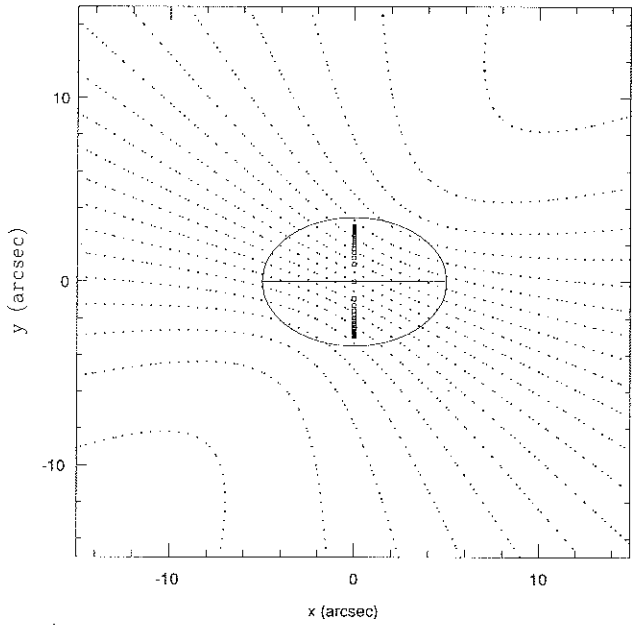
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 90.0$, $\theta= 90.0$
Apparent axial ratio = 0.70, $\rho_a= 90.0$, kinematic misalignment = 0.0



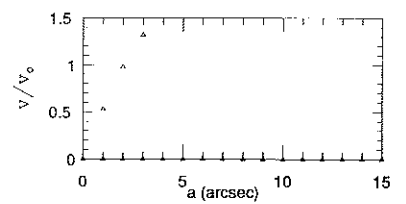
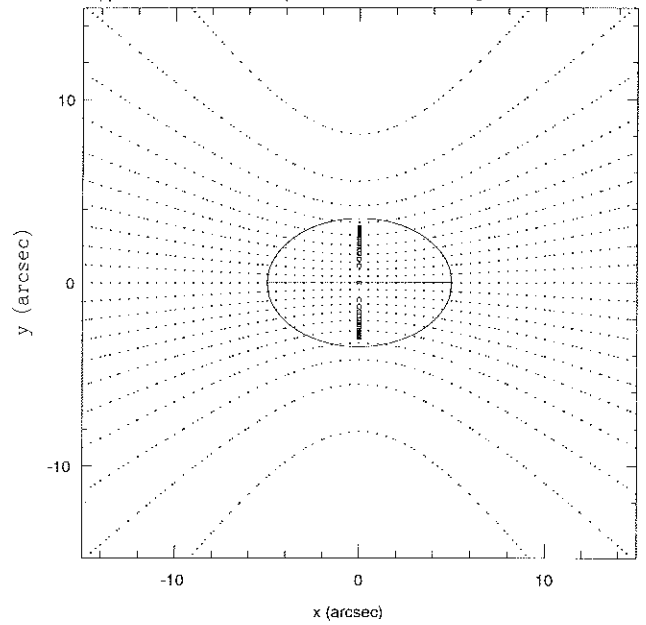
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 90.0$, $\theta= 90.0$
Apparent axial ratio = 0.70, $\rho_a= 90.0$, kinematic misalignment = 15.0

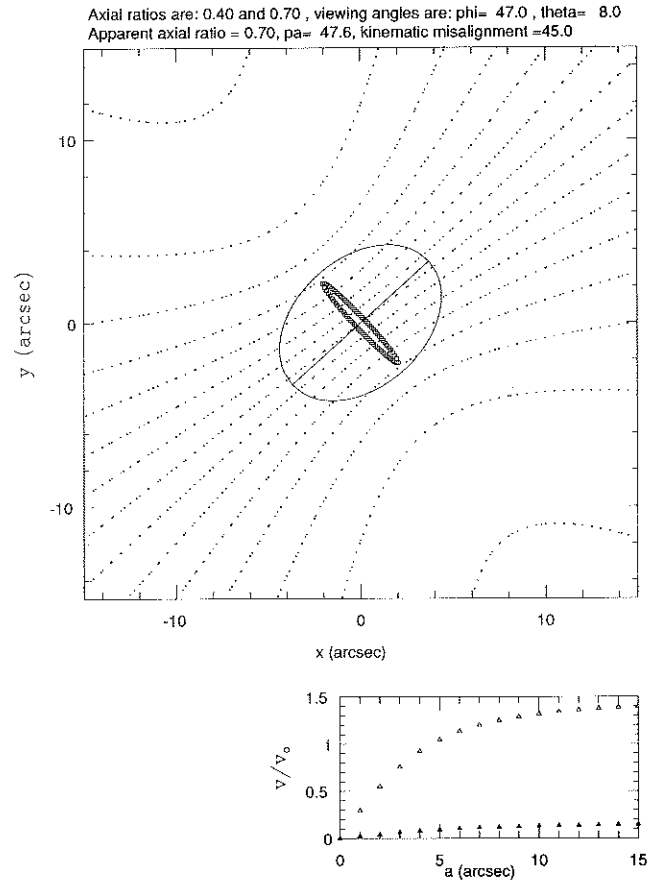
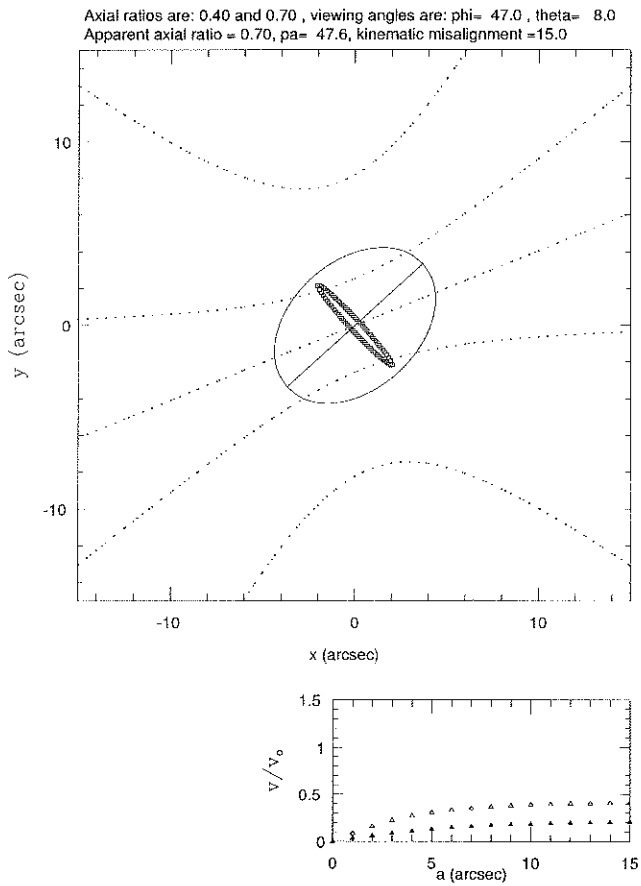
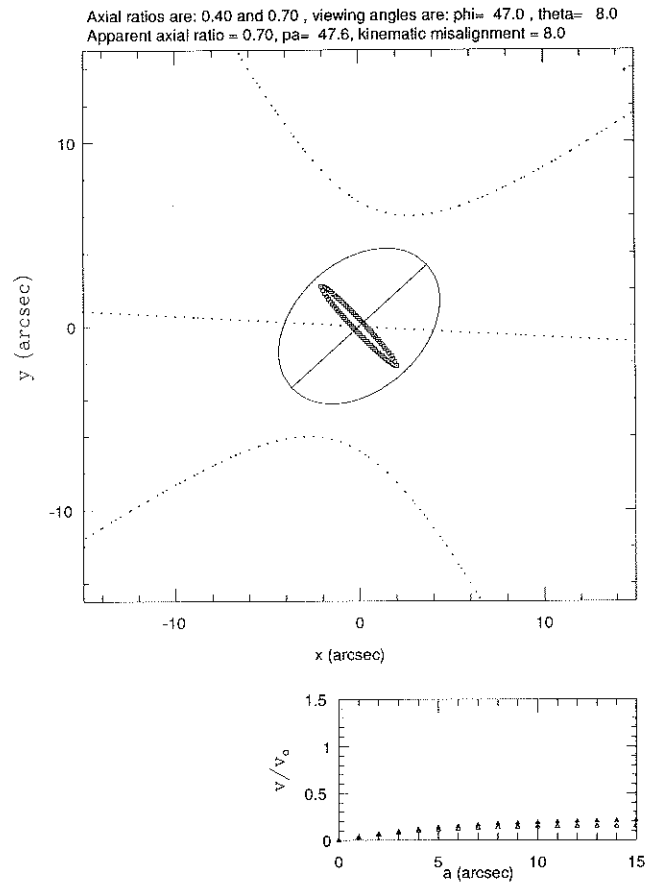
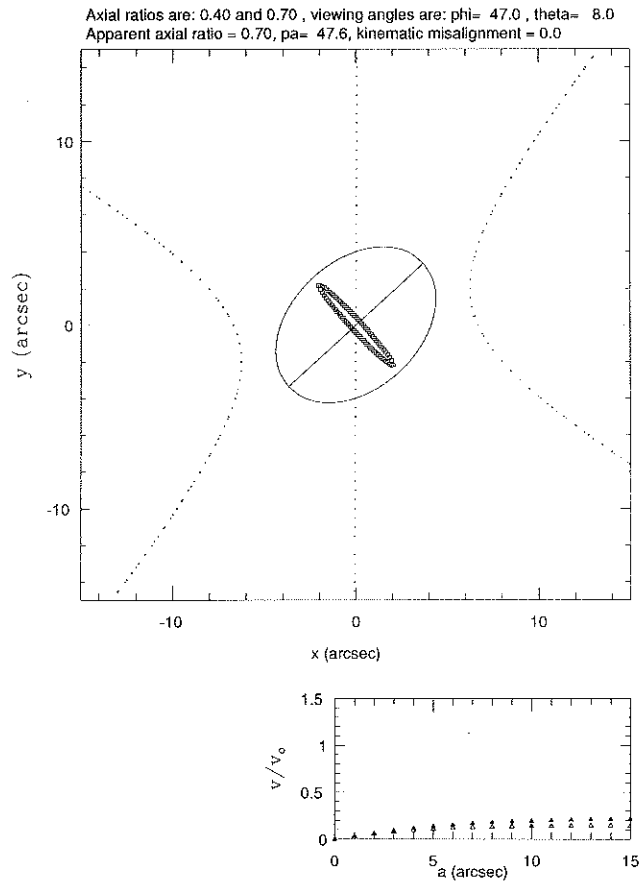


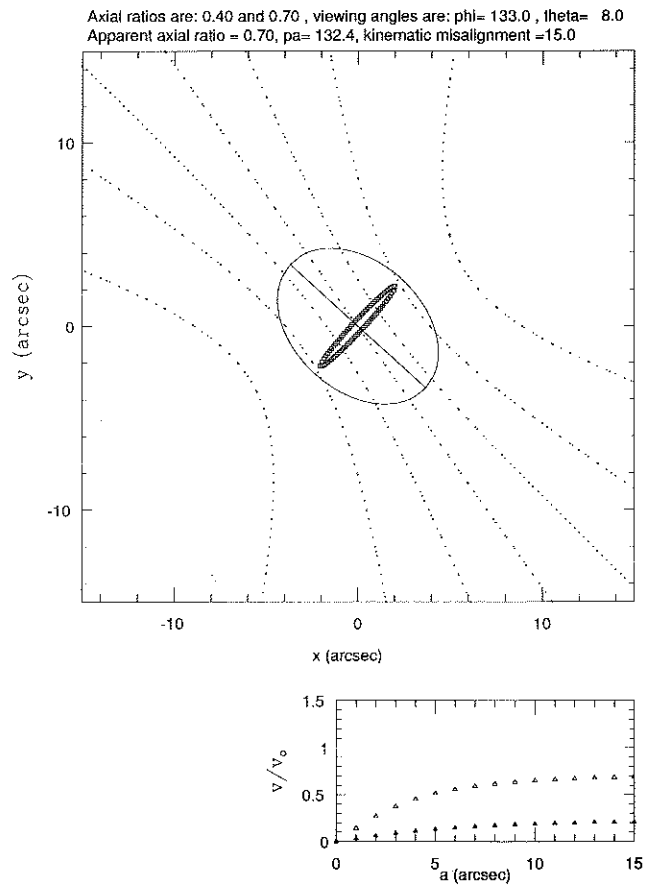
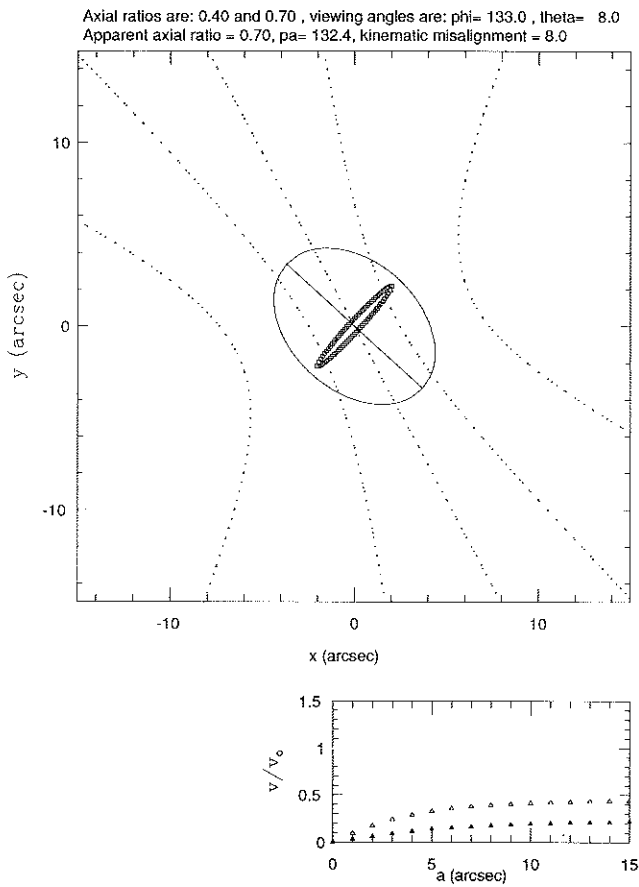
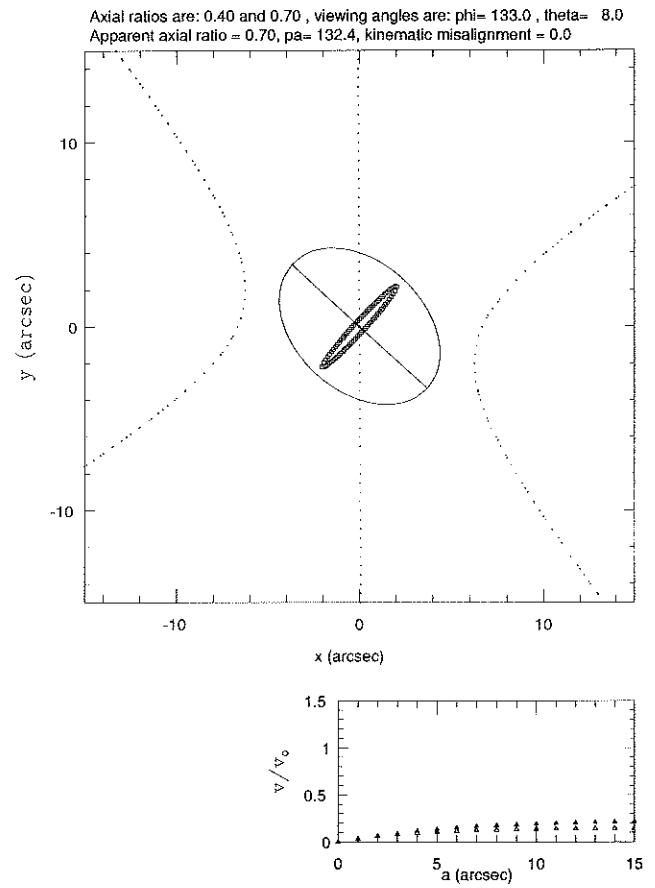
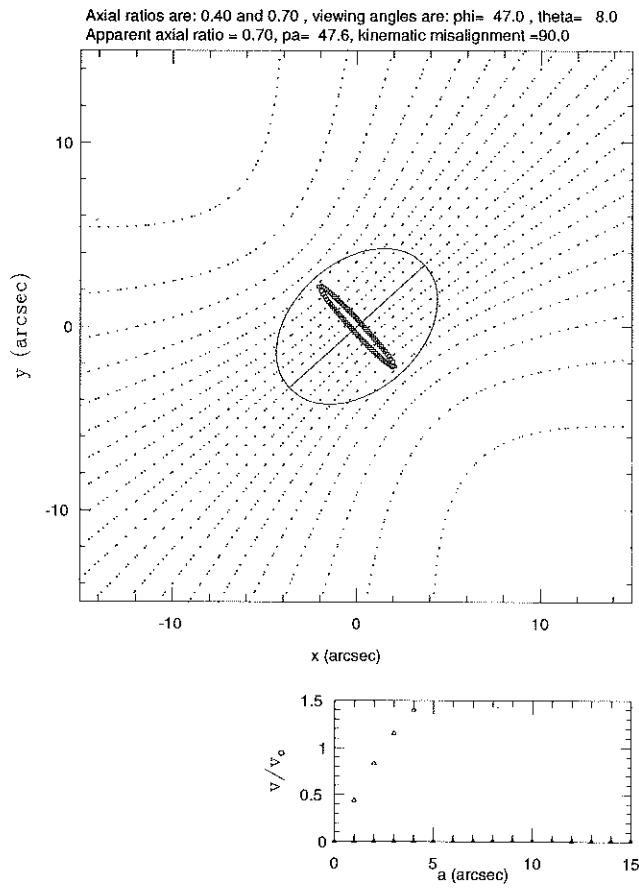
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 90.0$, $\theta= 90.0$
Apparent axial ratio = 0.70, $\rho_a= 90.0$, kinematic misalignment = 45.0



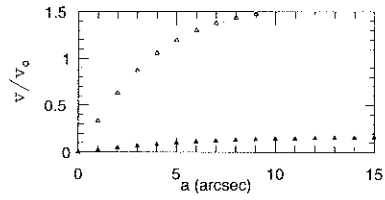
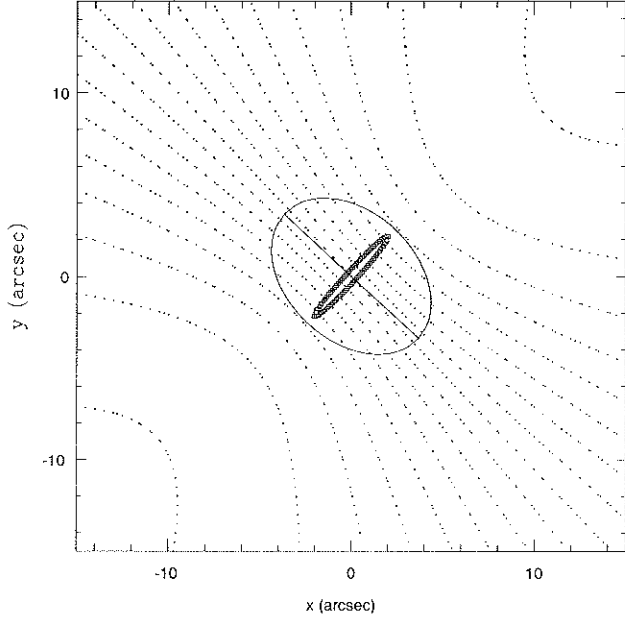
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 90.0$, $\theta= 90.0$
Apparent axial ratio = 0.70, $\rho_a= 90.0$, kinematic misalignment = 90.0



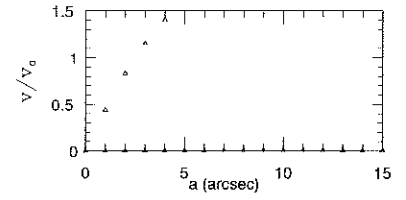
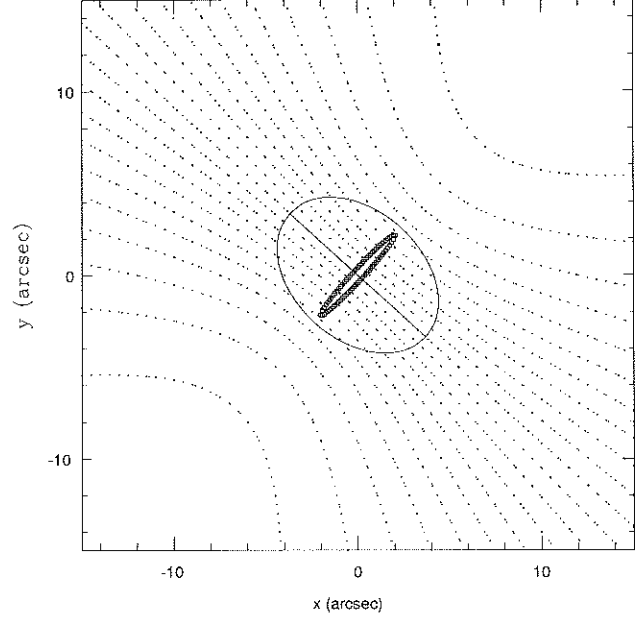




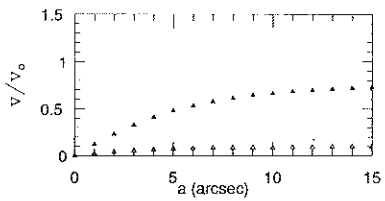
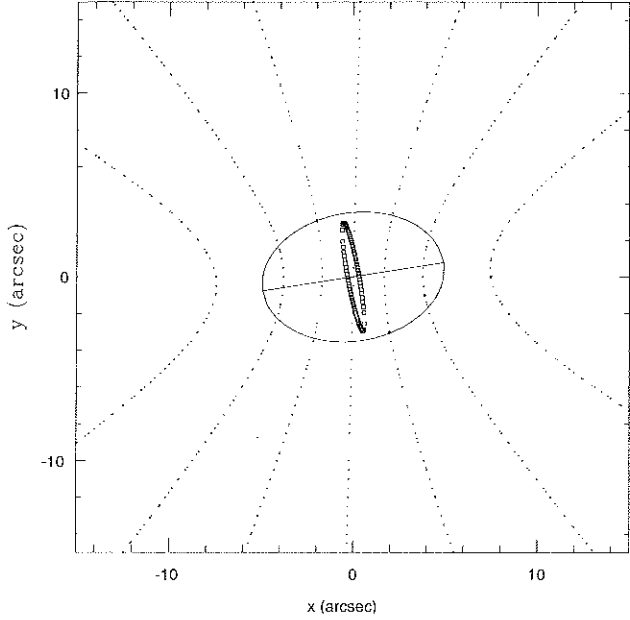
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi=133.0$, $\theta=8.0$
 Apparent axial ratio = 0.70, $pa=132.4$, kinematic misalignment =45.0



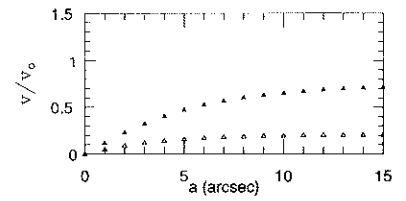
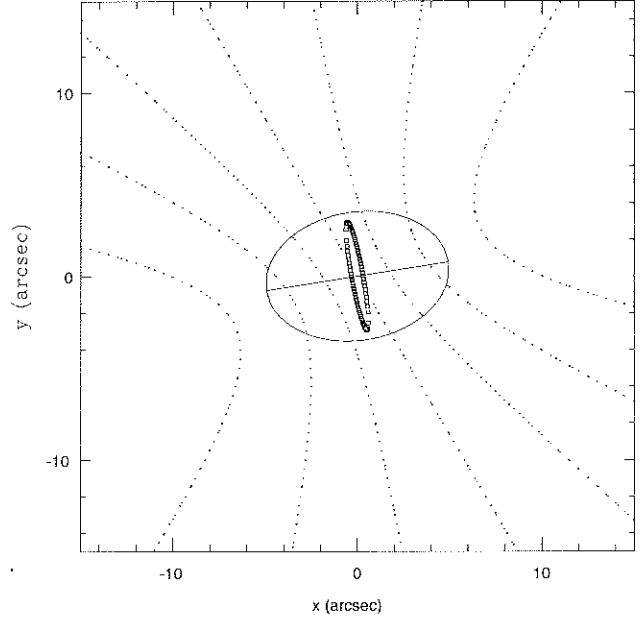
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi=133.0$, $\theta=8.0$
 Apparent axial ratio = 0.70, $pa=132.4$, kinematic misalignment =90.0



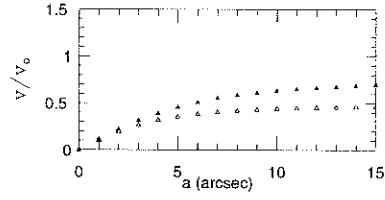
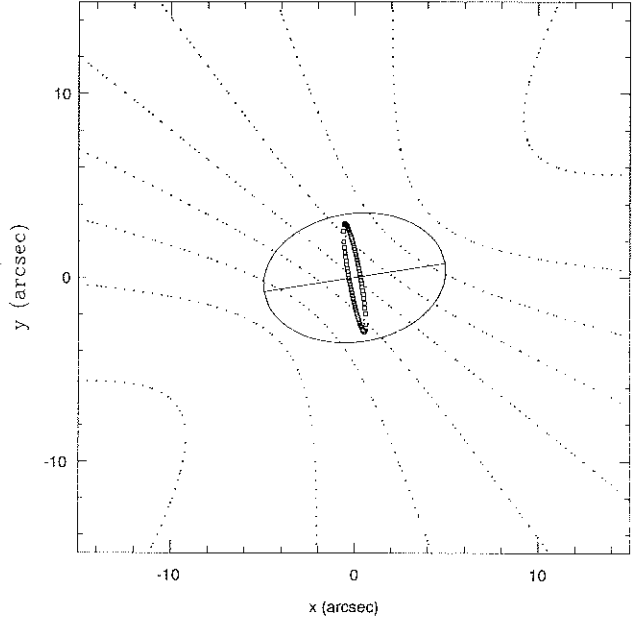
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=78.0$, $\theta=30.0$
 Apparent axial ratio = 0.70, $pa=81.1$, kinematic misalignment = 0.0



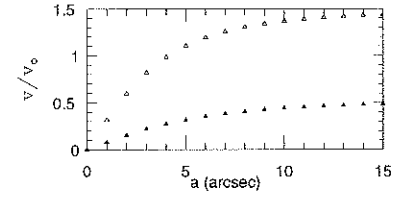
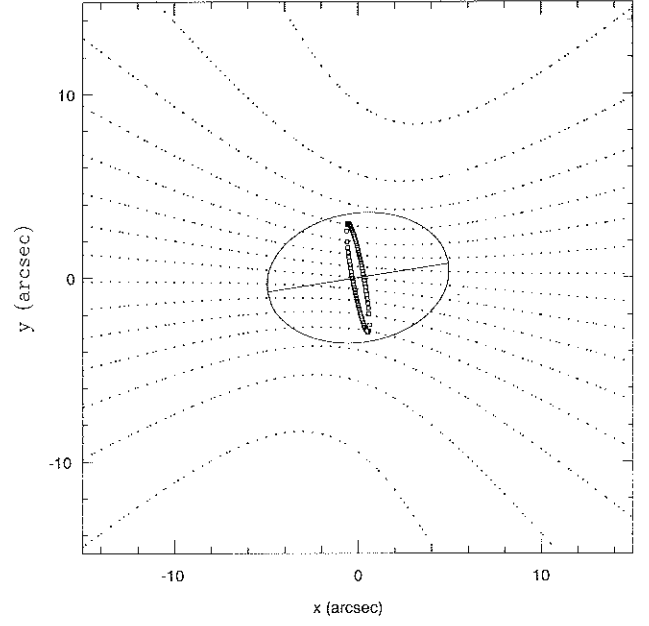
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=78.0$, $\theta=30.0$
 Apparent axial ratio = 0.70, $pa=81.1$, kinematic misalignment = 8.0



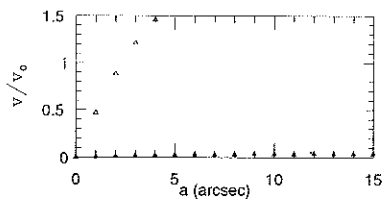
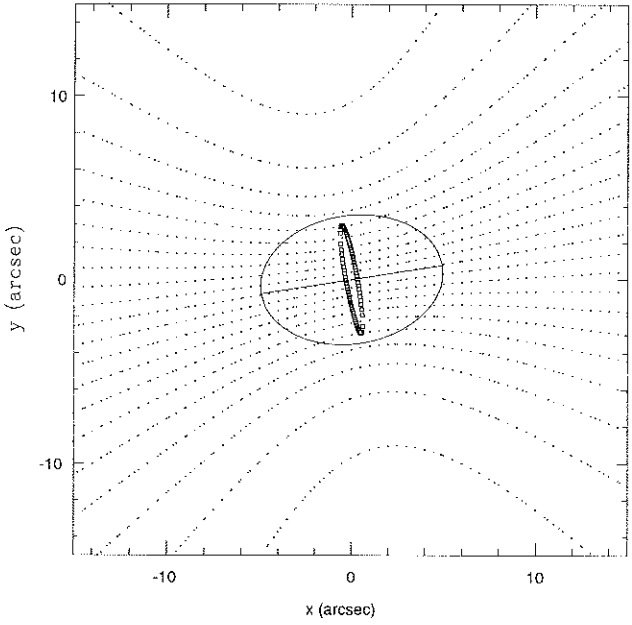
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=78.0$, $\theta=30.0$
Apparent axial ratio = 0.70, $pa=81.1$, kinematic misalignment =15.0



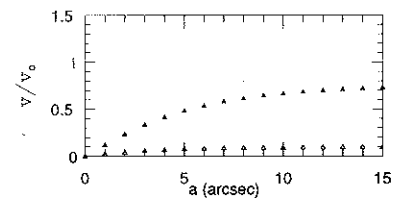
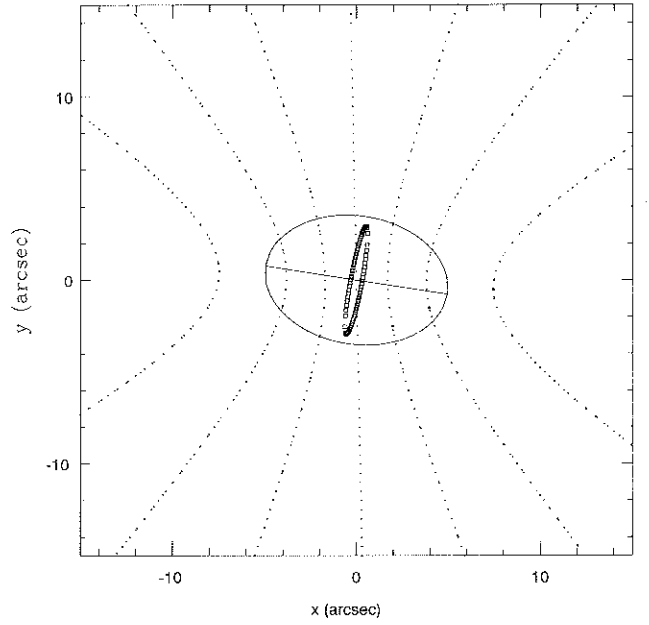
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=78.0$, $\theta=30.0$
Apparent axial ratio = 0.70, $pa=81.1$, kinematic misalignment =45.0



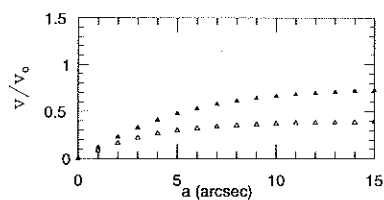
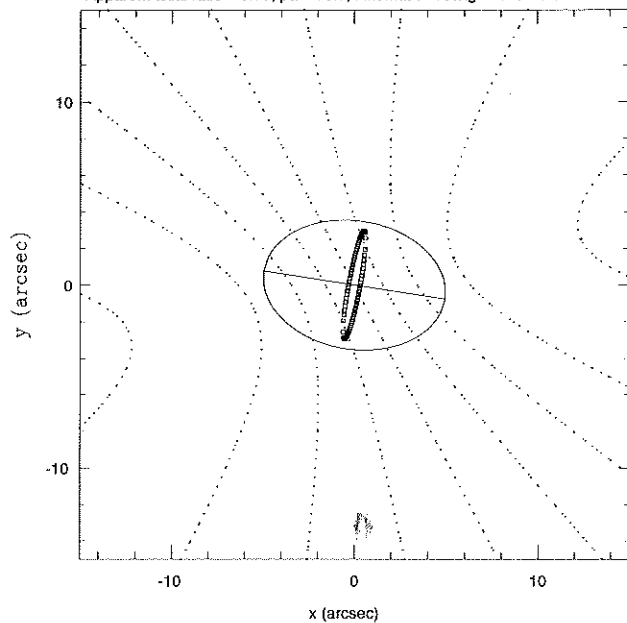
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=78.0$, $\theta=30.0$
Apparent axial ratio = 0.70, $pa=81.1$, kinematic misalignment =90.0



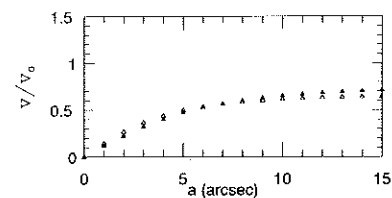
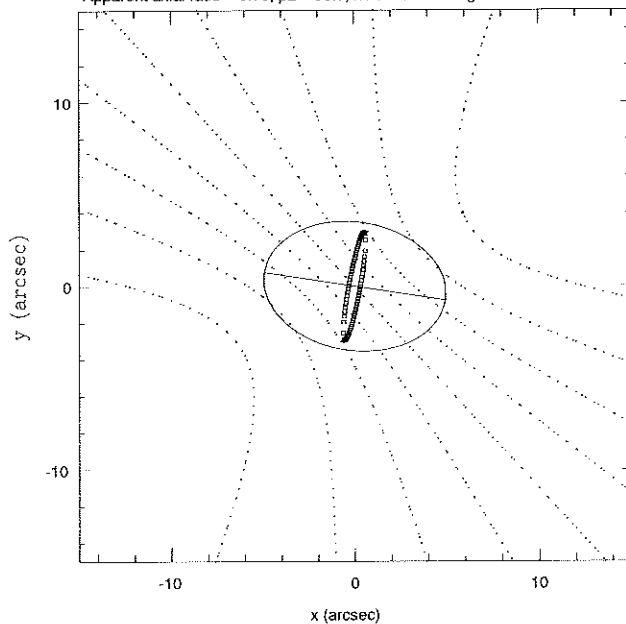
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=102.0$, $\theta=30.0$
Apparent axial ratio = 0.70, $pa=98.9$, kinematic misalignment = 0.0



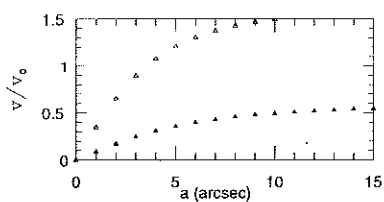
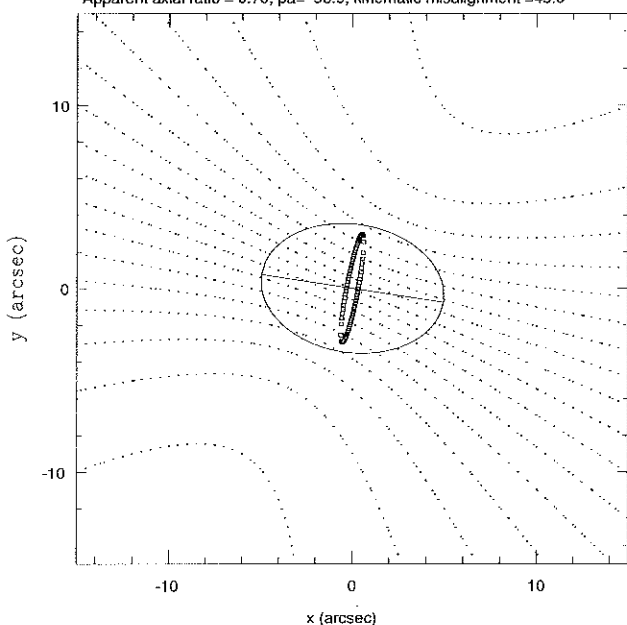
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=102.0$, $\theta=30.0$
Apparent axial ratio = 0.70, $pa=98.9$, kinematic misalignment = 8.0



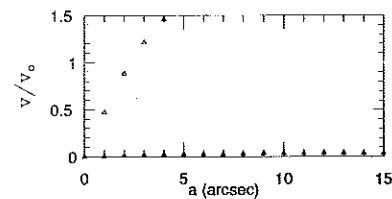
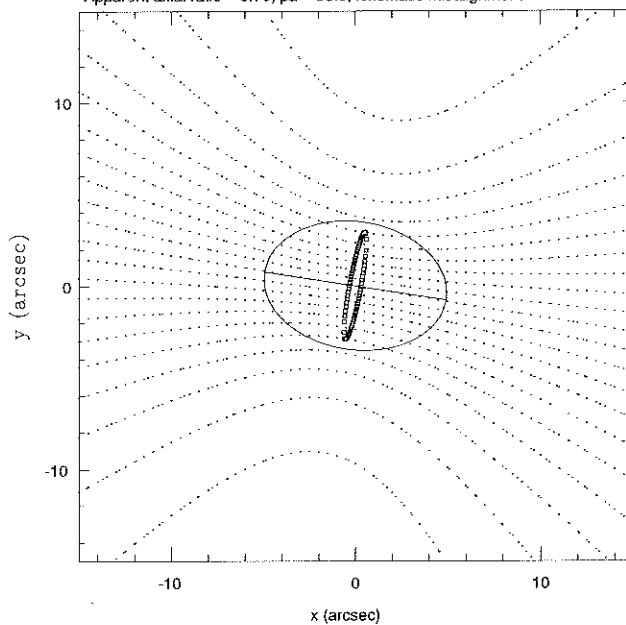
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=102.0$, $\theta=30.0$
Apparent axial ratio = 0.70, $pa=98.9$, kinematic misalignment = 15.0



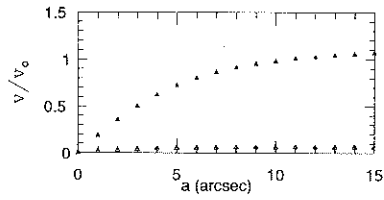
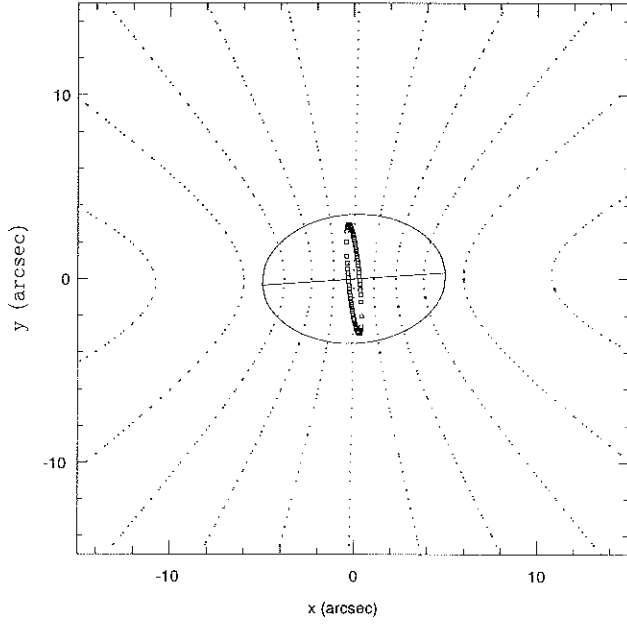
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=102.0$, $\theta=30.0$
Apparent axial ratio = 0.70, $pa=98.9$, kinematic misalignment = 45.0



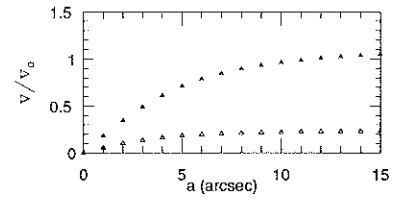
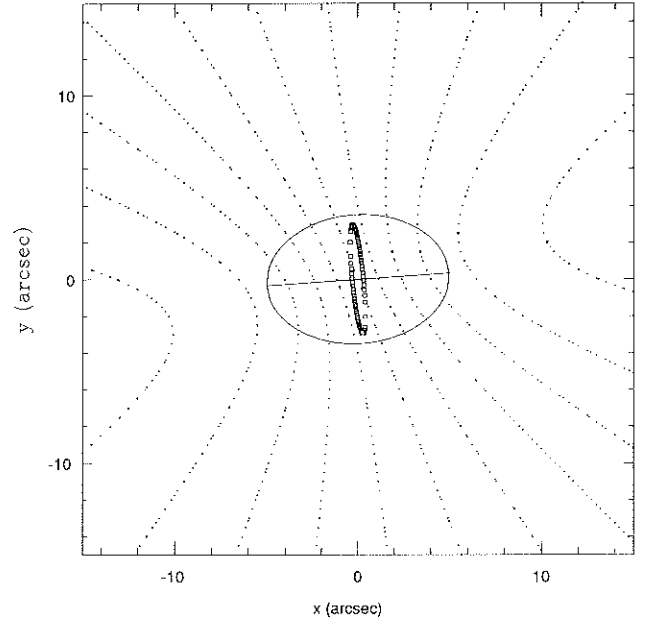
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=102.0$, $\theta=30.0$
Apparent axial ratio = 0.70, $pa=98.9$, kinematic misalignment = 90.0



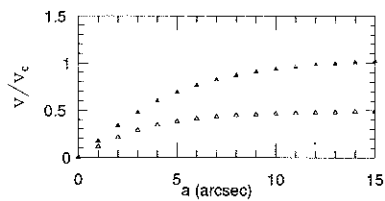
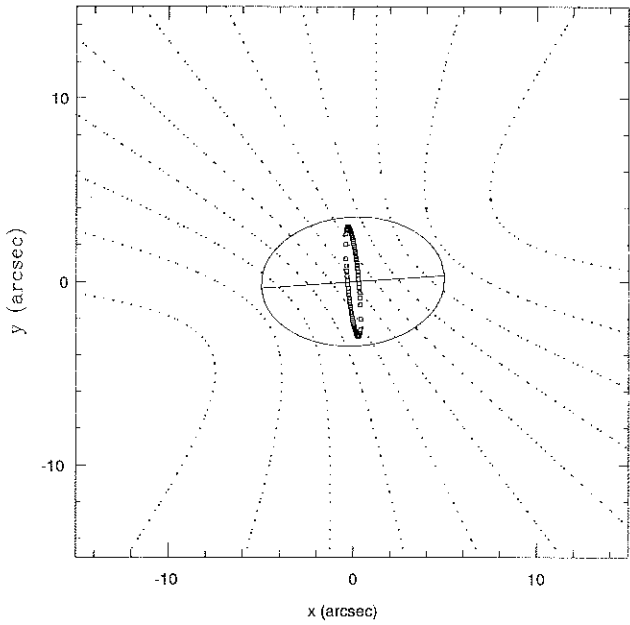
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 82.0$, $\theta = 47.0$
Apparent axial ratio = 0.70, $pa = 86.1$, kinematic misalignment = 0.0



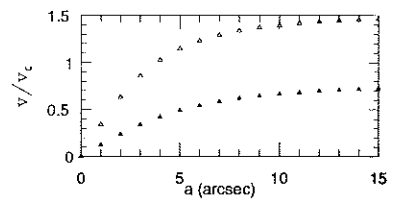
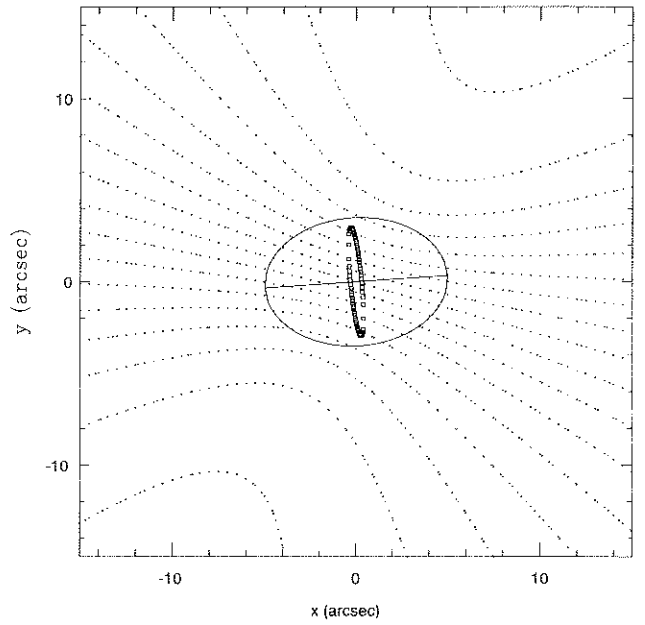
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 82.0$, $\theta = 47.0$
Apparent axial ratio = 0.70, $pa = 86.1$, kinematic misalignment = 8.0



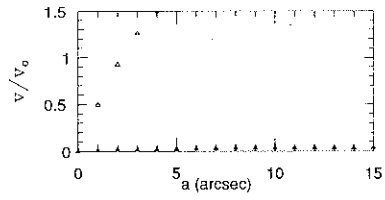
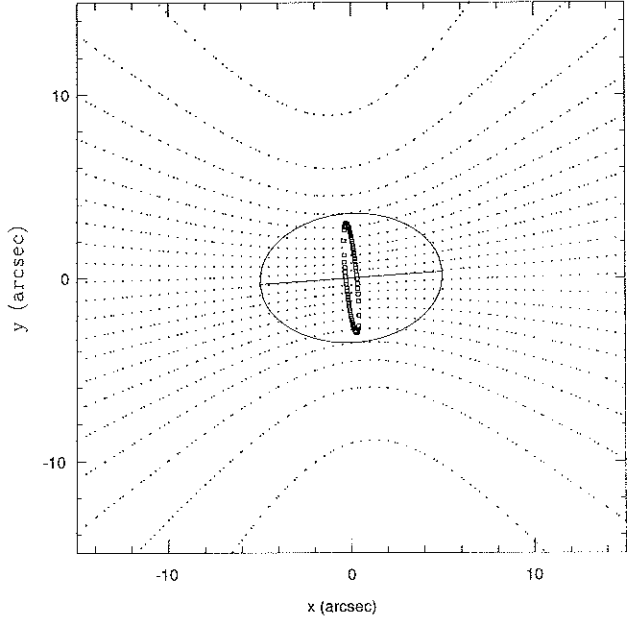
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 82.0$, $\theta = 47.0$
Apparent axial ratio = 0.70, $pa = 86.1$, kinematic misalignment = 15.0



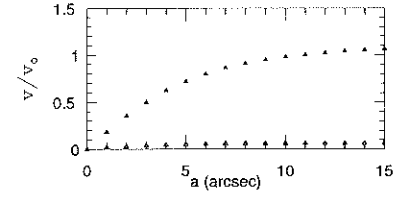
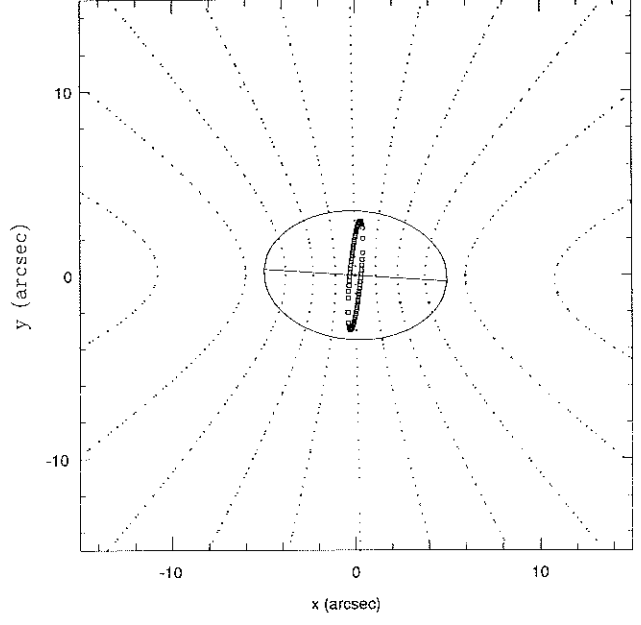
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 82.0$, $\theta = 47.0$
Apparent axial ratio = 0.70, $pa = 86.1$, kinematic misalignment = 45.0



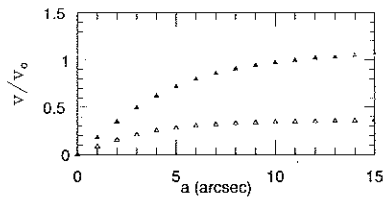
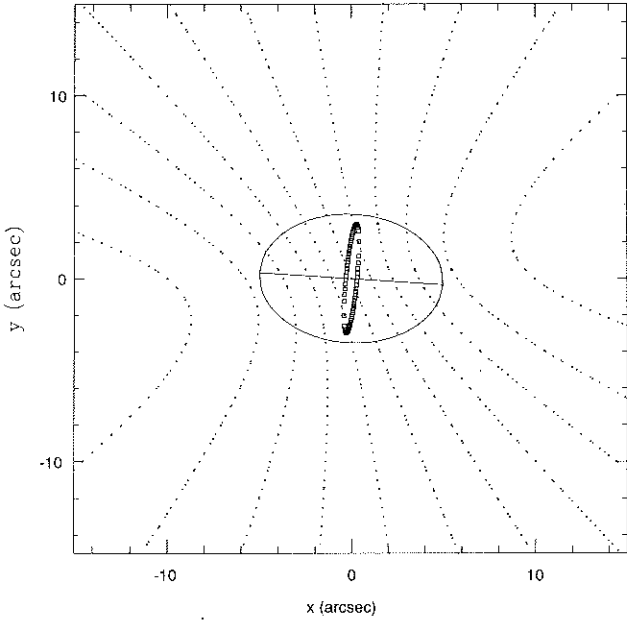
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 82.0$, $\theta = 47.0$
 Apparent axial ratio = 0.70, $pa = 86.1$, kinematic misalignment = 90.0



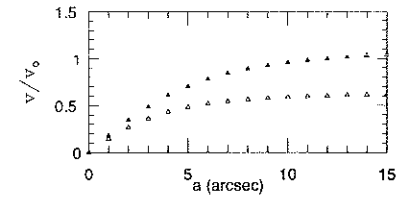
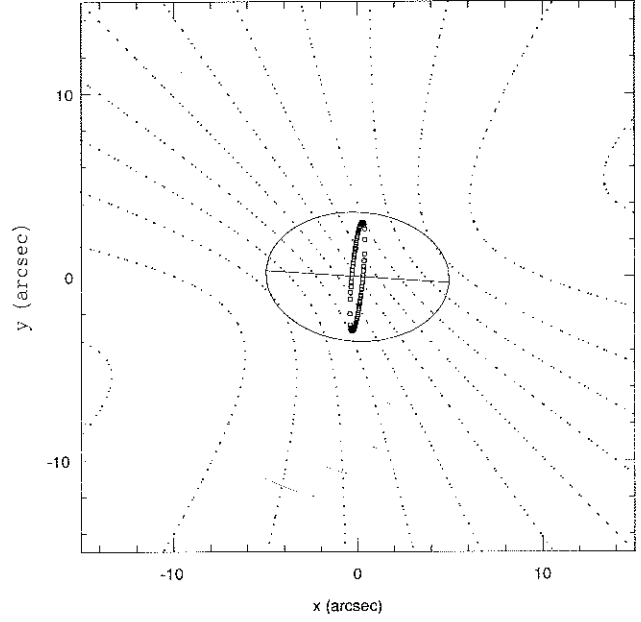
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 98.0$, $\theta = 47.0$
 Apparent axial ratio = 0.70, $pa = 93.9$, kinematic misalignment = 0.0



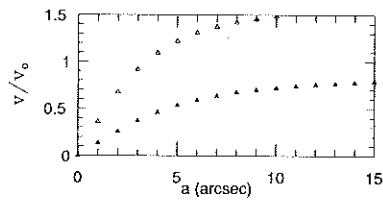
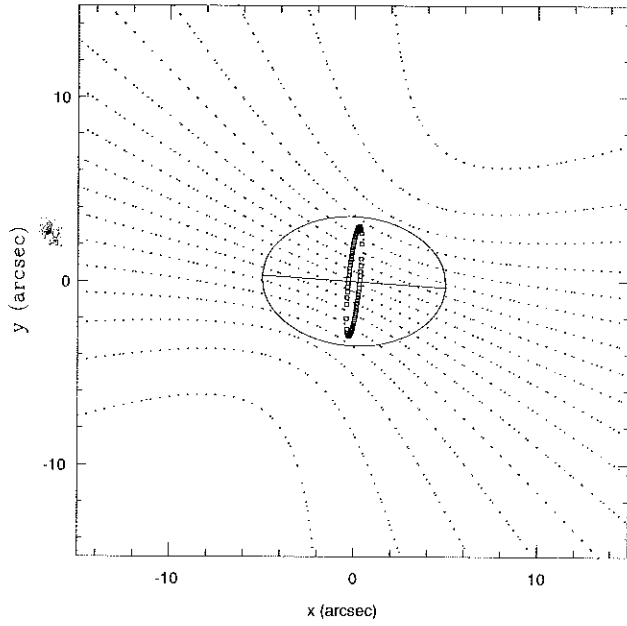
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 98.0$, $\theta = 47.0$
 Apparent axial ratio = 0.70, $pa = 93.9$, kinematic misalignment = 8.0



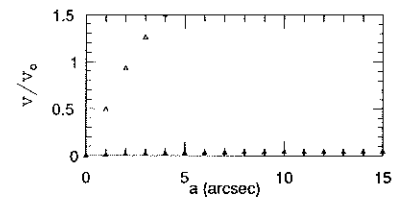
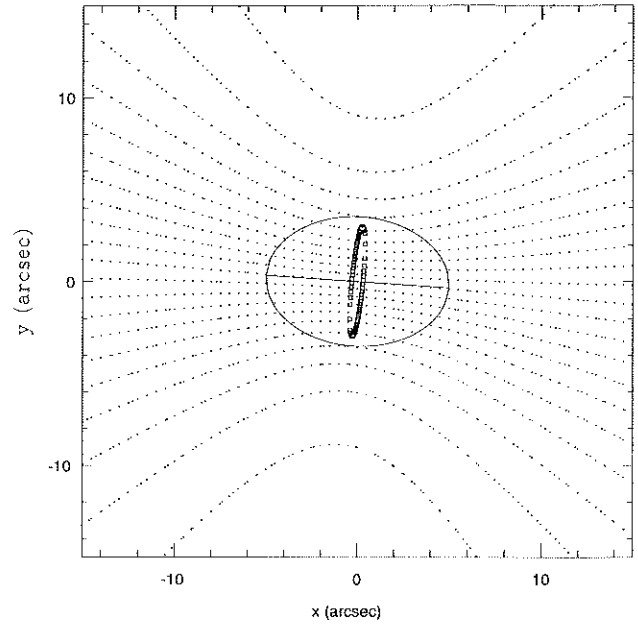
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 98.0$, $\theta = 47.0$
 Apparent axial ratio = 0.70, $pa = 93.9$, kinematic misalignment = 15.0



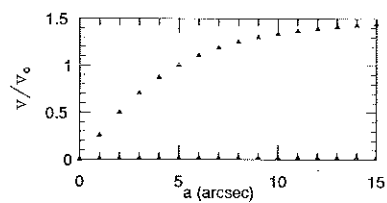
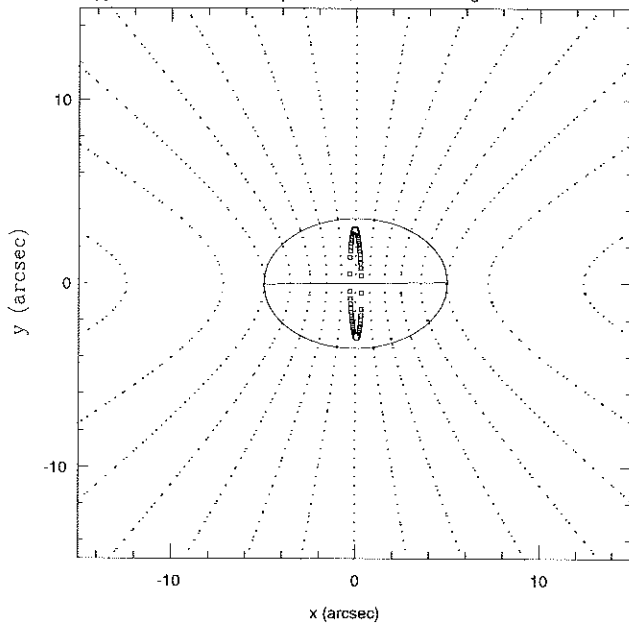
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 98.0$, $\theta= 47.0$
Apparent axial ratio = 0.70, $pa= 93.9$, kinematic misalignment =45.0



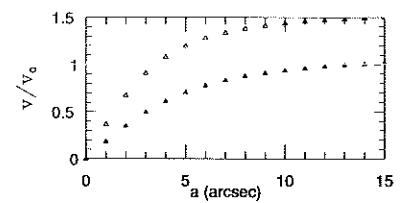
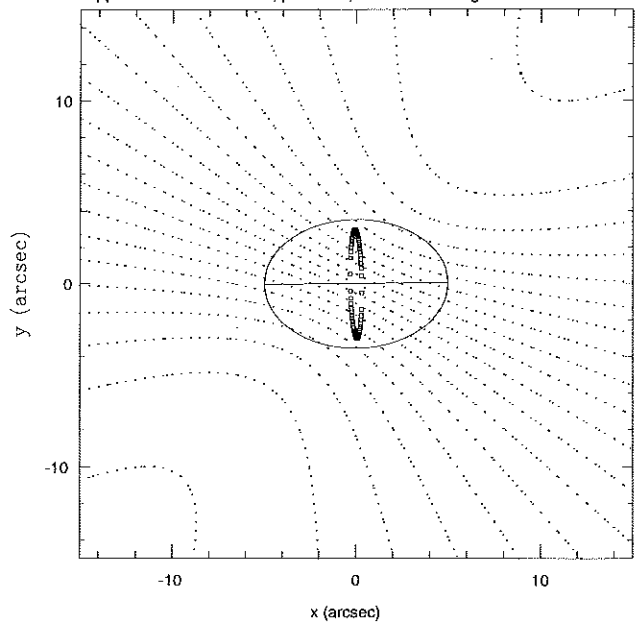
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 98.0$, $\theta= 47.0$
Apparent axial ratio = 0.70, $pa= 93.9$, kinematic misalignment =90.0



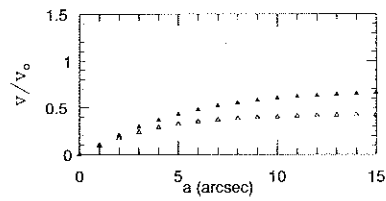
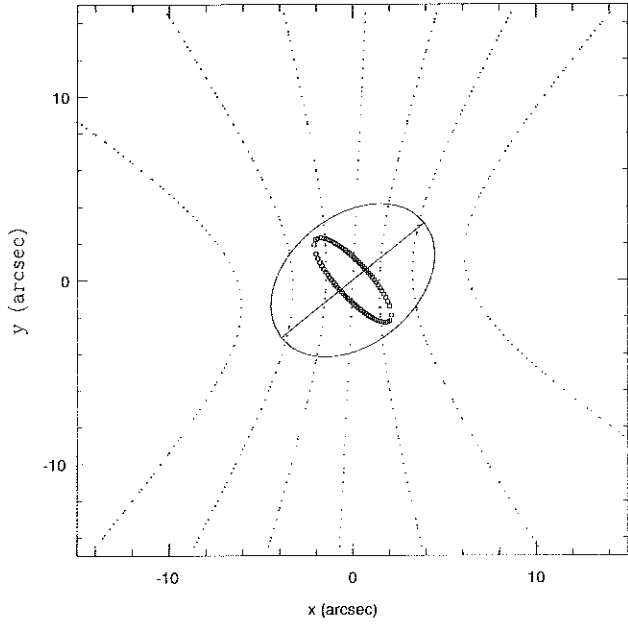
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 84.0$, $\theta= 80.0$
Apparent axial ratio = 0.71, $pa= 89.4$, kinematic misalignment = 0.0



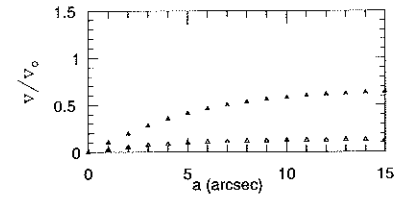
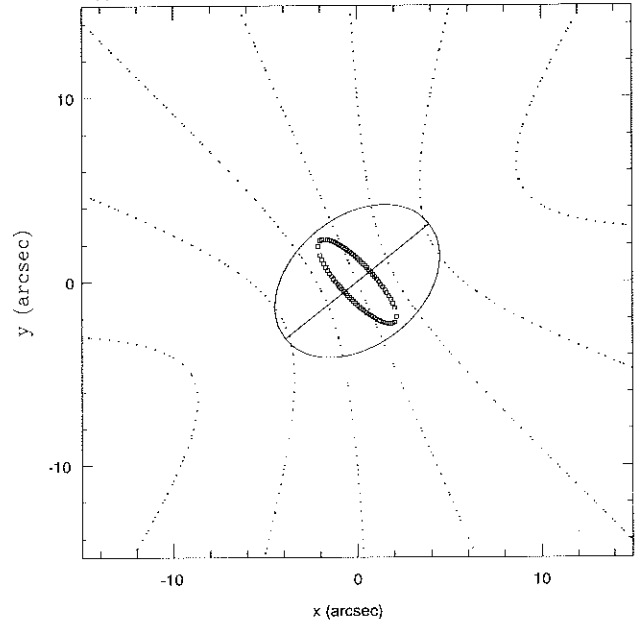
Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi= 84.0$, $\theta= 80.0$
Apparent axial ratio = 0.71, $pa= 89.4$, kinematic misalignment =45.0



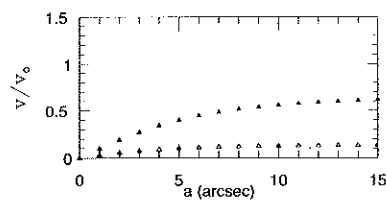
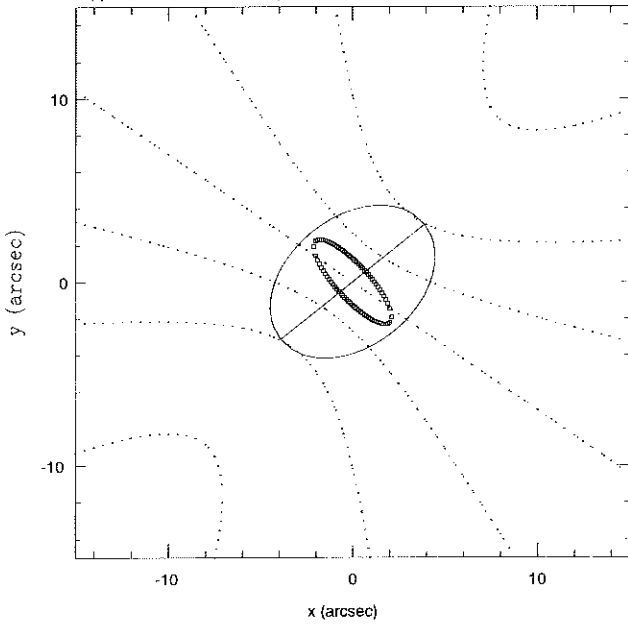
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 45.0$, $\theta = 25.0$
 Apparent axial ratio = 0.70, $pa = 51.4$, kinematic misalignment = 0.0



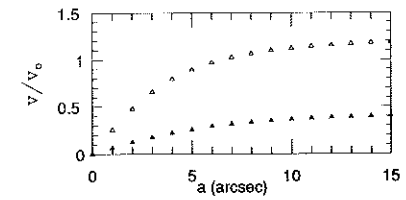
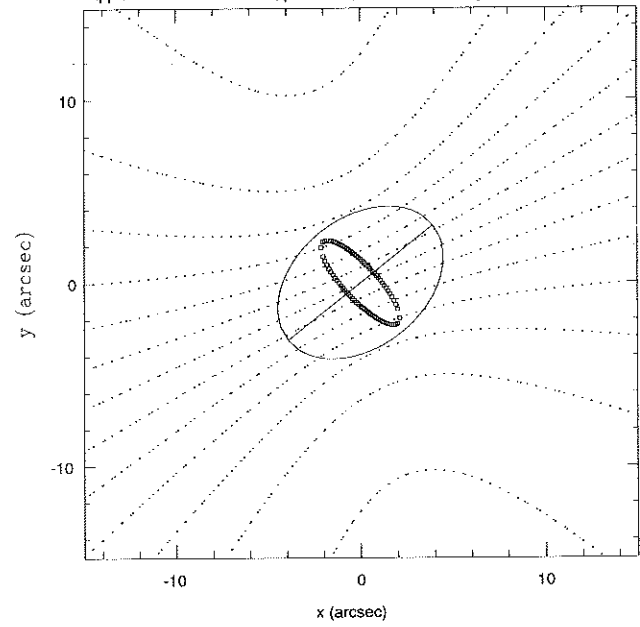
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 45.0$, $\theta = 25.0$
 Apparent axial ratio = 0.70, $pa = 51.4$, kinematic misalignment = 8.0



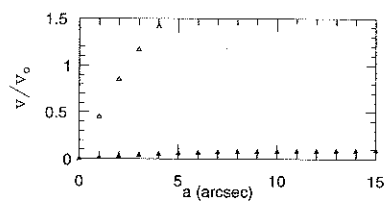
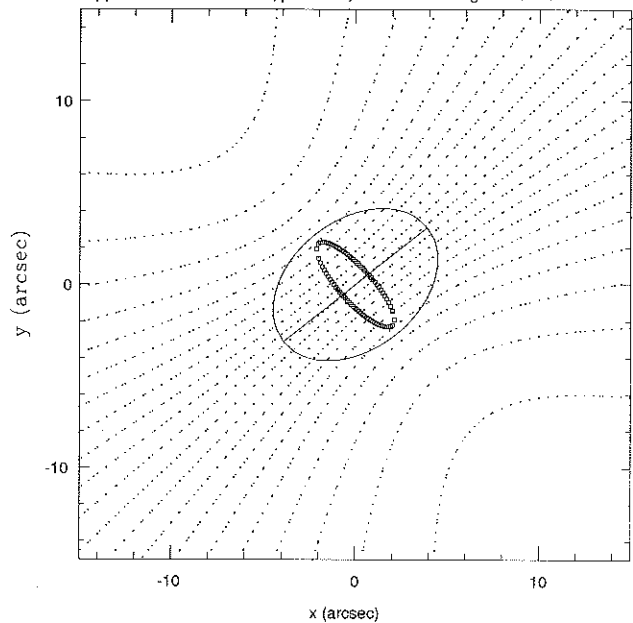
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 45.0$, $\theta = 25.0$
 Apparent axial ratio = 0.70, $pa = 51.4$, kinematic misalignment = 15.0



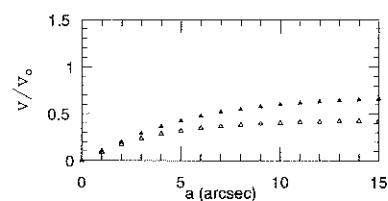
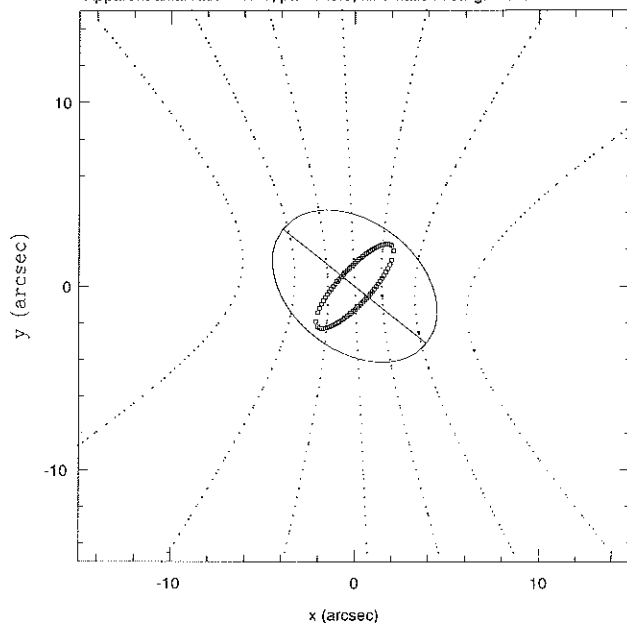
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 45.0$, $\theta = 25.0$
 Apparent axial ratio = 0.70, $pa = 51.4$, kinematic misalignment = 45.0



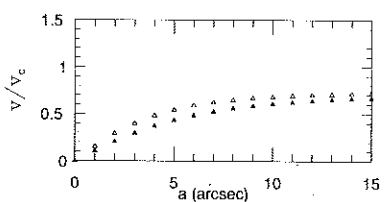
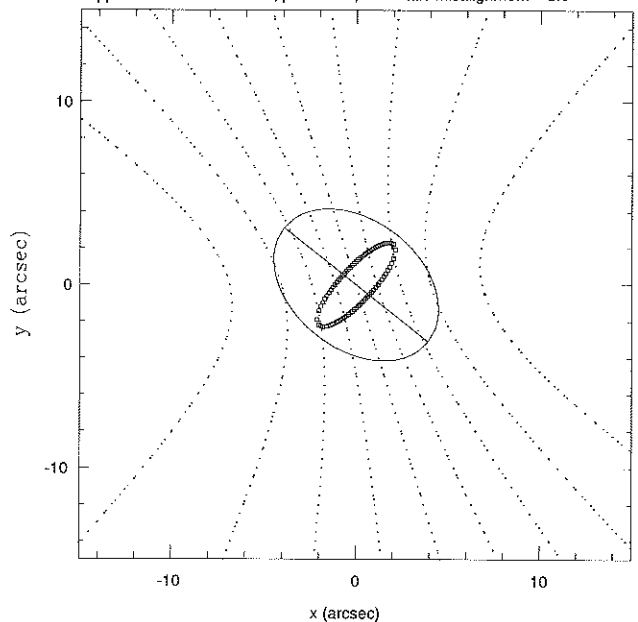
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 45.0$, $\theta= 25.0$
Apparent axial ratio = 0.70, $pa= 51.4$, kinematic misalignment =90.0



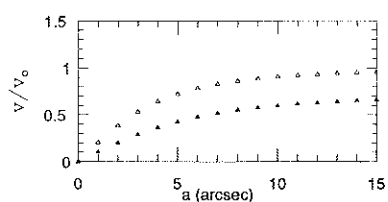
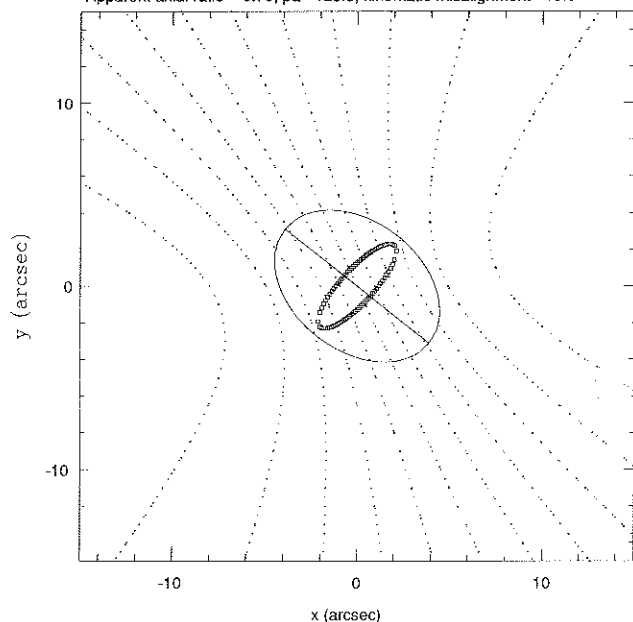
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 135.0$, $\theta= 25.0$
Apparent axial ratio = 0.70, $pa= 128.6$, kinematic misalignment = 0.0

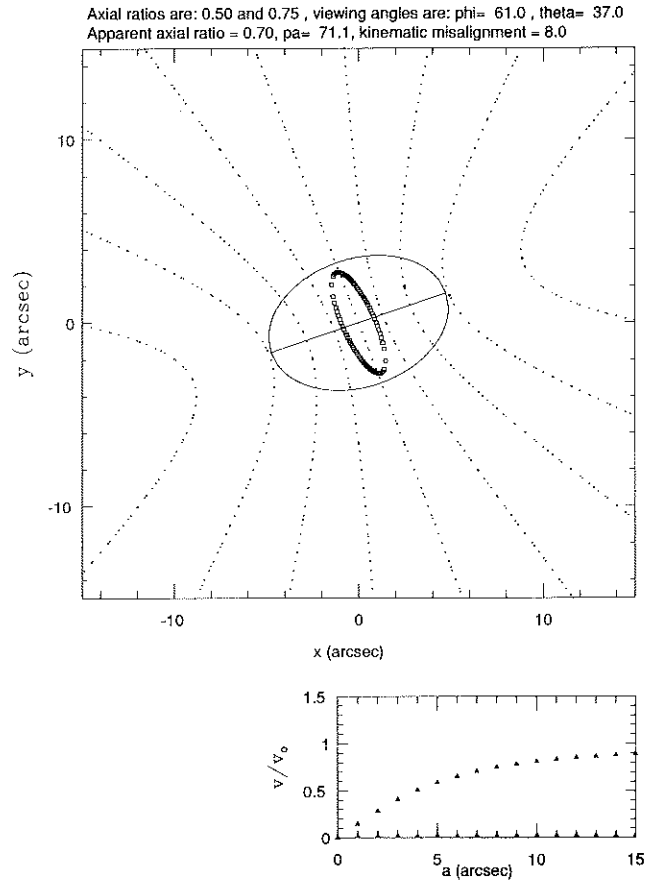
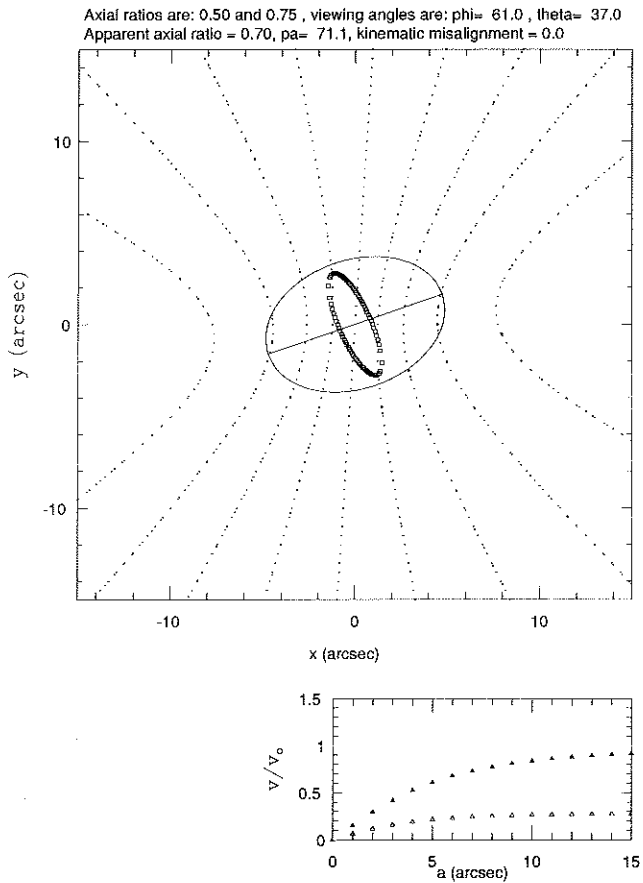
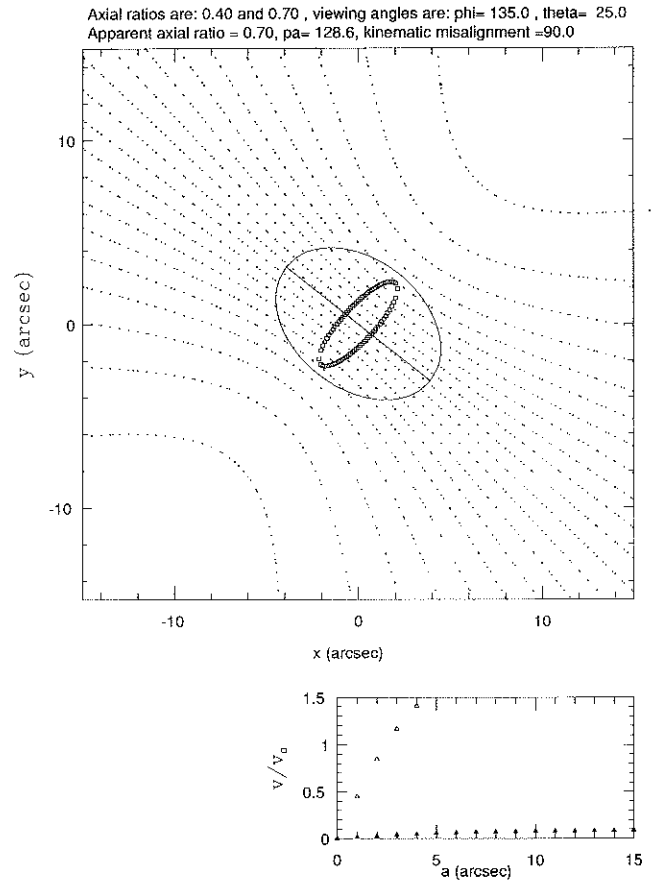
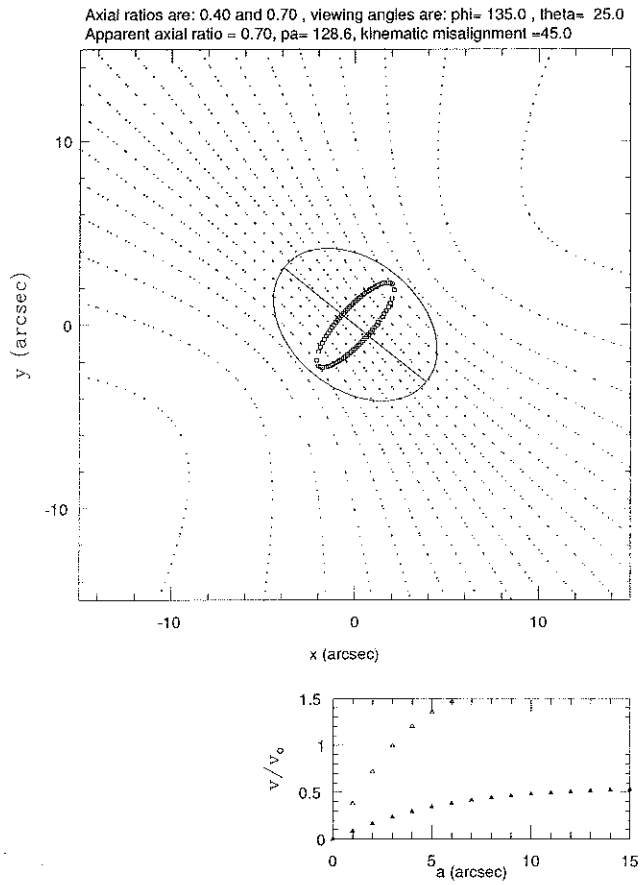


Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 135.0$, $\theta= 25.0$
Apparent axial ratio = 0.70, $pa= 128.6$, kinematic misalignment = 8.0

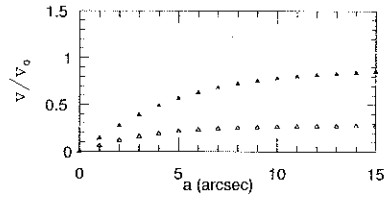
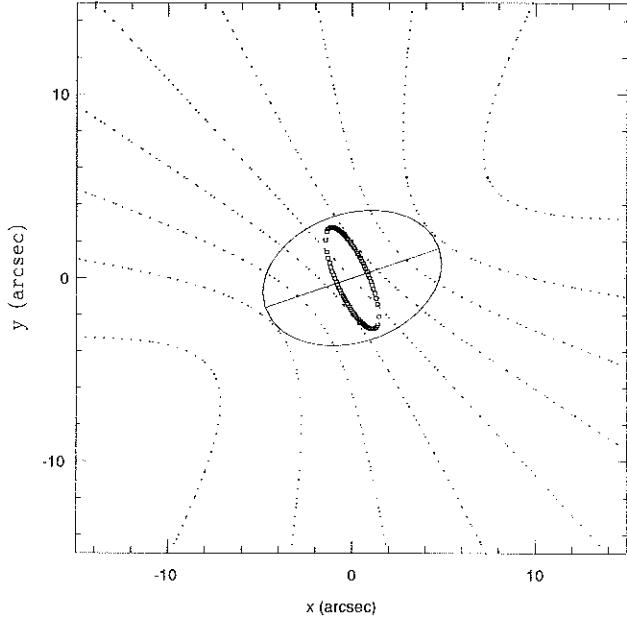


Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 135.0$, $\theta= 25.0$
Apparent axial ratio = 0.70, $pa= 128.6$, kinematic misalignment =15.0

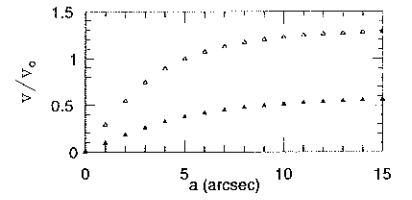
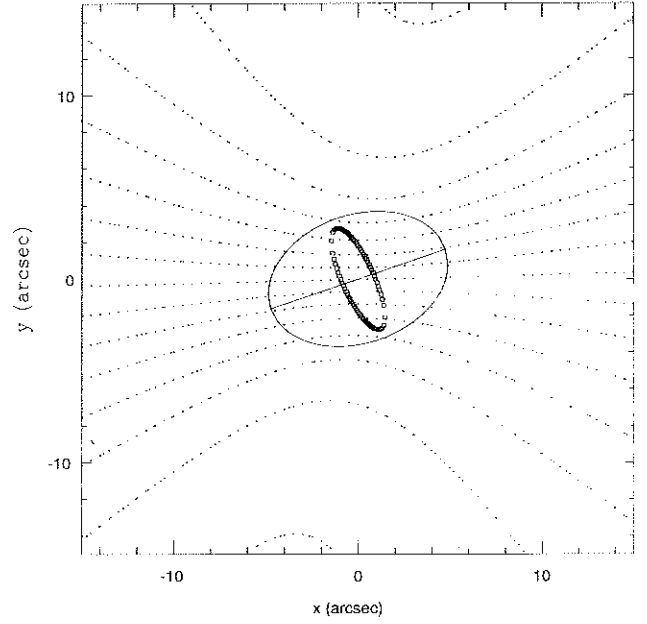




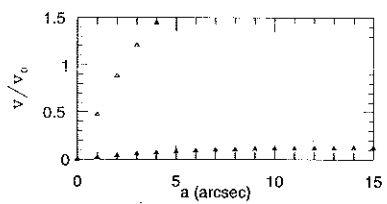
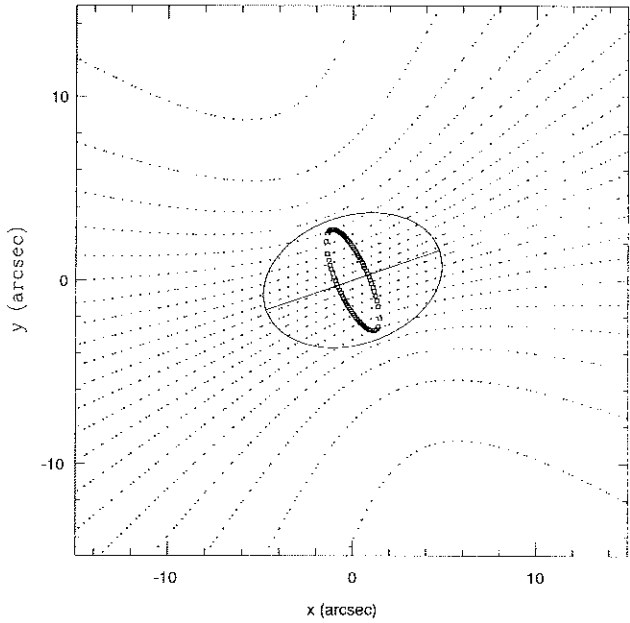
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi= 61.0$, $\theta= 37.0$
Apparent axial ratio = 0.70, $pa= 71.1$, kinematic misalignment =15.0



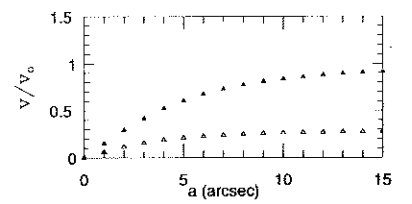
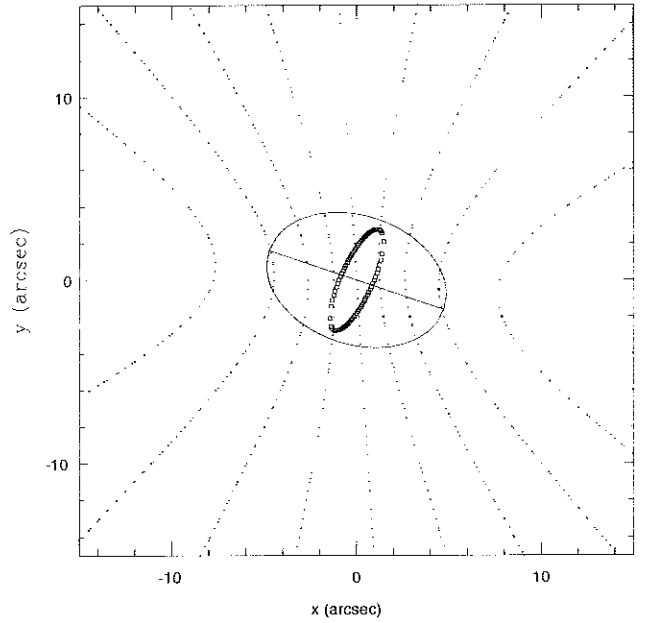
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi= 61.0$, $\theta= 37.0$
Apparent axial ratio = 0.70, $pa= 71.1$, kinematic misalignment =45.0



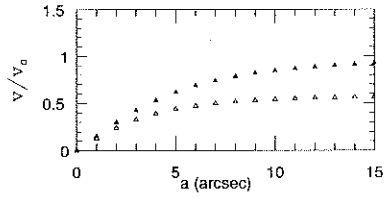
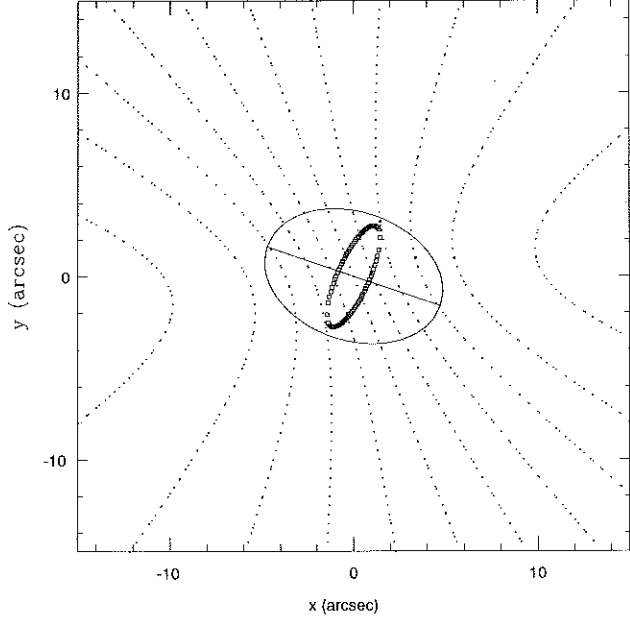
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi= 61.0$, $\theta= 37.0$
Apparent axial ratio = 0.70, $pa= 71.1$, kinematic misalignment =90.0



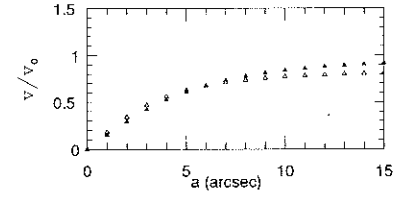
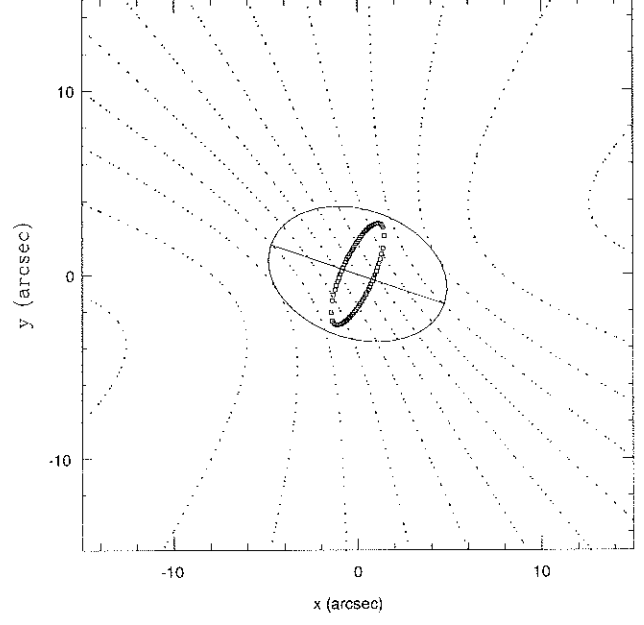
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi= 119.0$, $\theta= 37.0$
Apparent axial ratio = 0.70, $pa= 108.9$, kinematic misalignment = 0.0



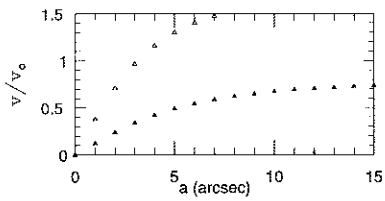
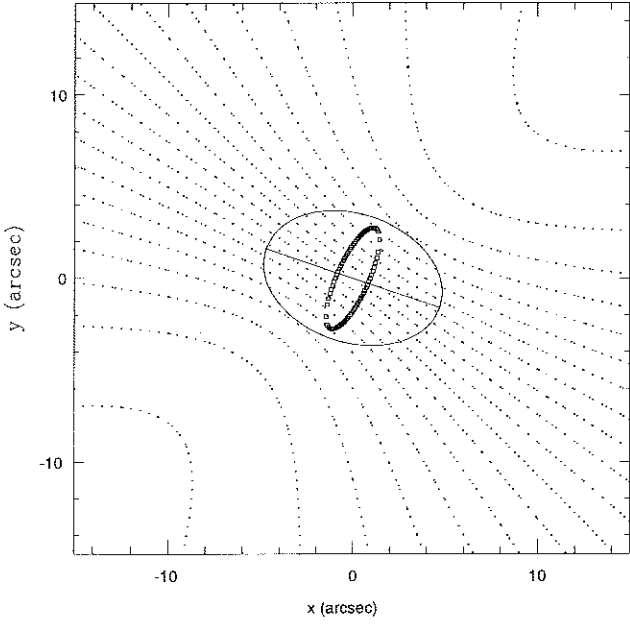
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=119.0$, $\theta=37.0$
 Apparent axial ratio = 0.70, $pa=108.9$, kinematic misalignment = 8.0



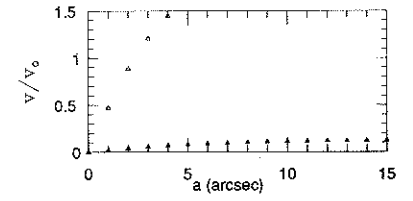
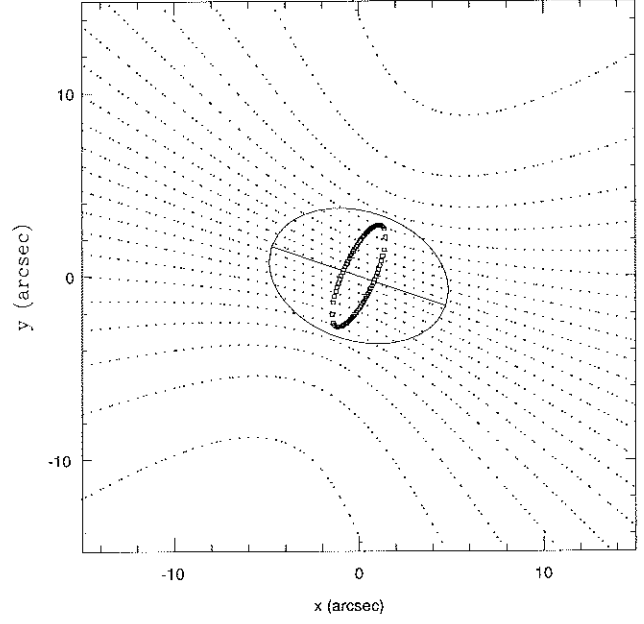
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=119.0$, $\theta=37.0$
 Apparent axial ratio = 0.70, $pa=108.9$, kinematic misalignment = 15.0



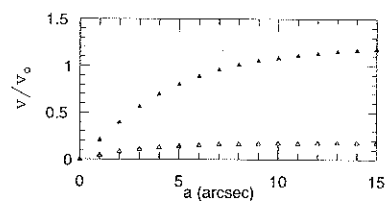
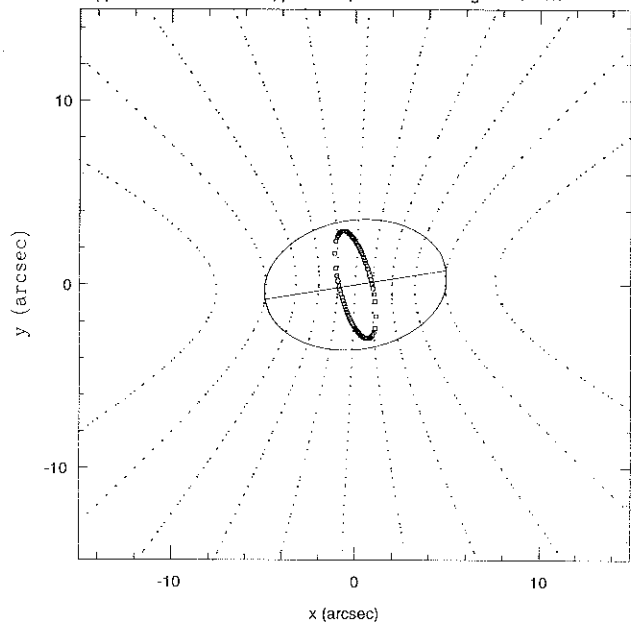
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=119.0$, $\theta=37.0$
 Apparent axial ratio = 0.70, $pa=108.9$, kinematic misalignment = 45.0



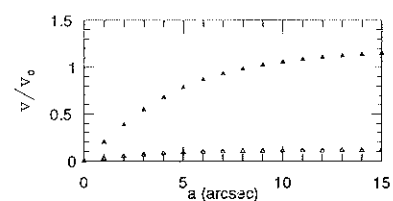
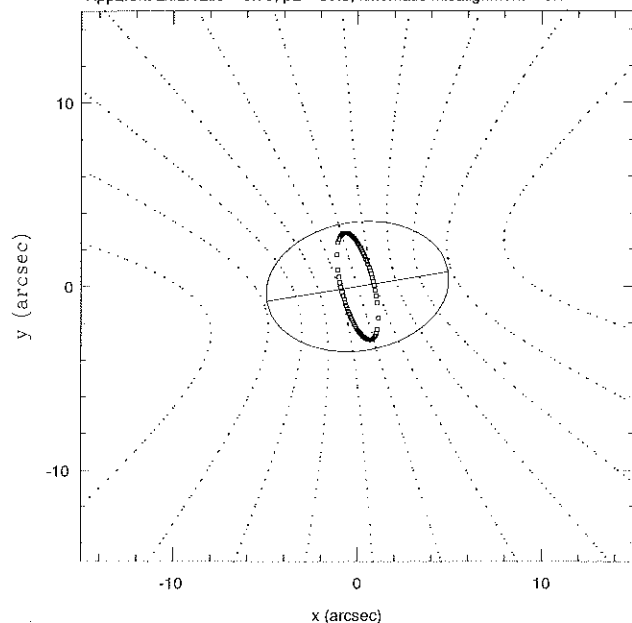
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=119.0$, $\theta=37.0$
 Apparent axial ratio = 0.70, $pa=108.9$, kinematic misalignment = 90.0



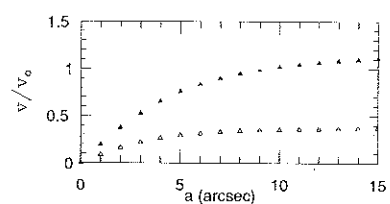
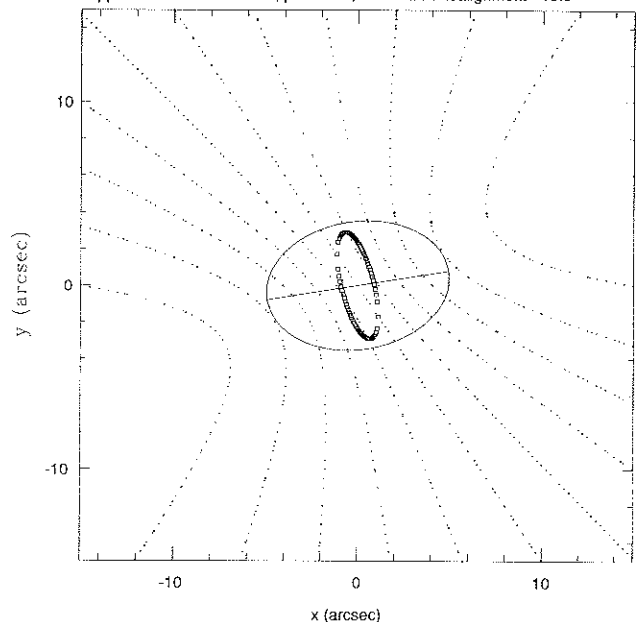
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 68.0$, $\theta= 52.0$
Apparent axial ratio = 0.70, $pa= 80.8$, kinematic misalignment = 0.0



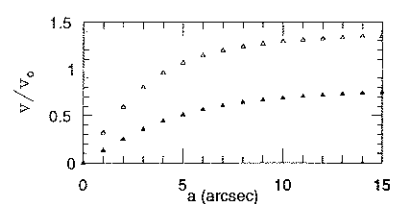
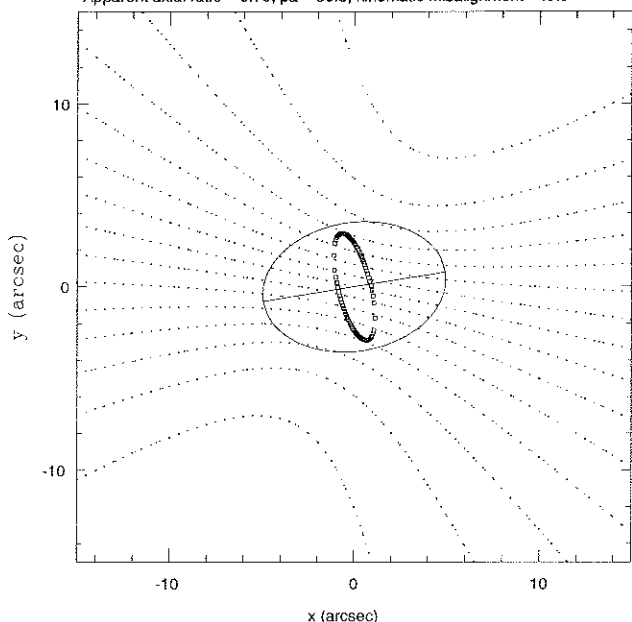
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 68.0$, $\theta= 52.0$
Apparent axial ratio = 0.70, $pa= 80.8$, kinematic misalignment = 8.0



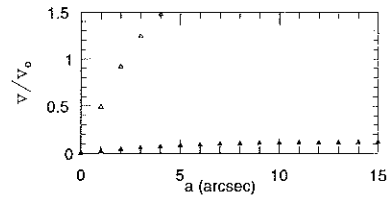
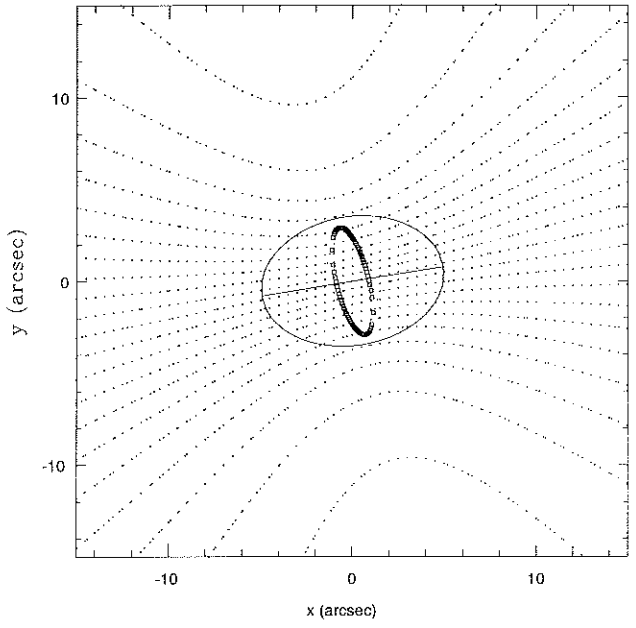
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 68.0$, $\theta= 52.0$
Apparent axial ratio = 0.70, $pa= 80.8$, kinematic misalignment = 15.0



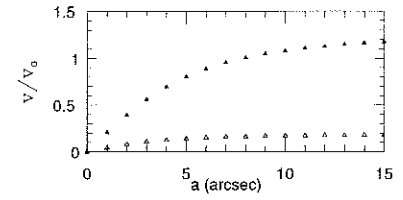
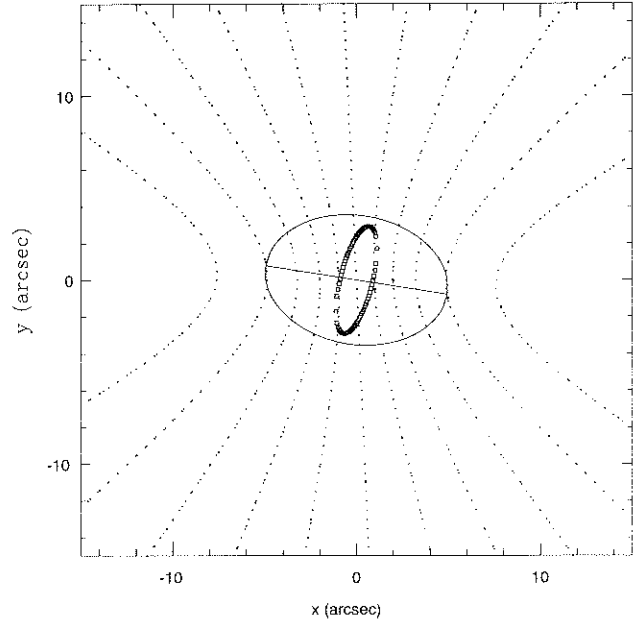
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi= 68.0$, $\theta= 52.0$
Apparent axial ratio = 0.70, $pa= 80.8$, kinematic misalignment = 45.0



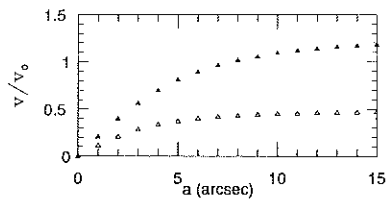
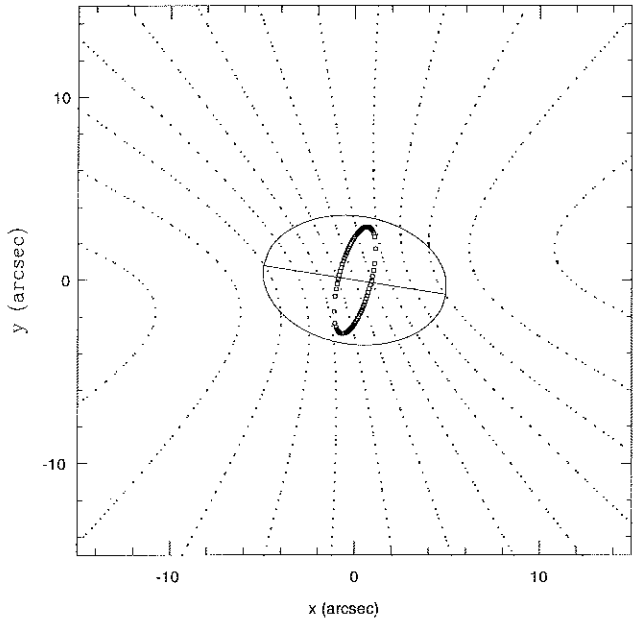
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 68.0$, $\theta = 52.0$
 Apparent axial ratio = 0.70, $pa = 80.8$, kinematic misalignment = -90.0



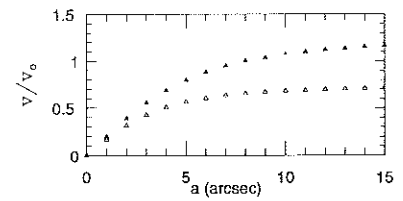
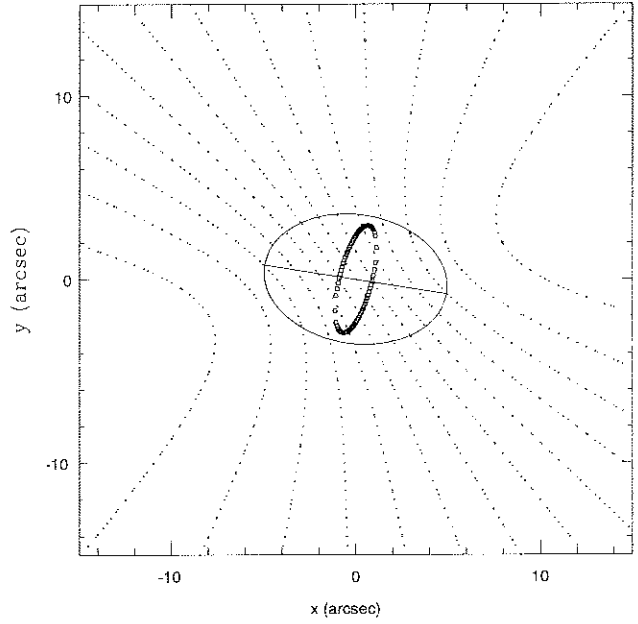
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 112.0$, $\theta = 52.0$
 Apparent axial ratio = 0.70, $pa = 99.2$, kinematic misalignment = 0.0



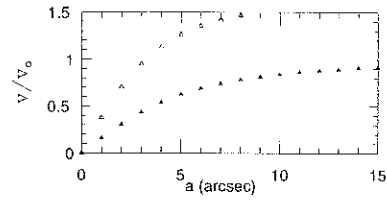
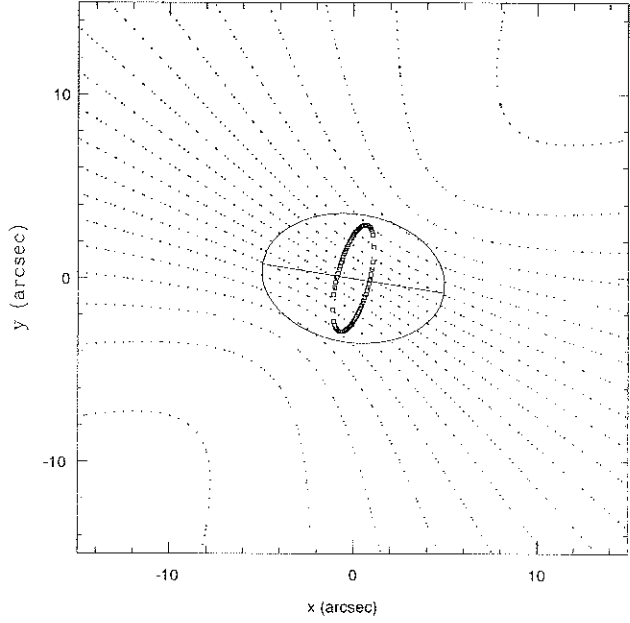
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 112.0$, $\theta = 52.0$
 Apparent axial ratio = 0.70, $pa = 99.2$, kinematic misalignment = 8.0



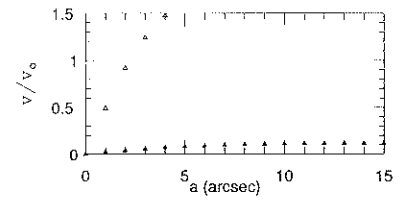
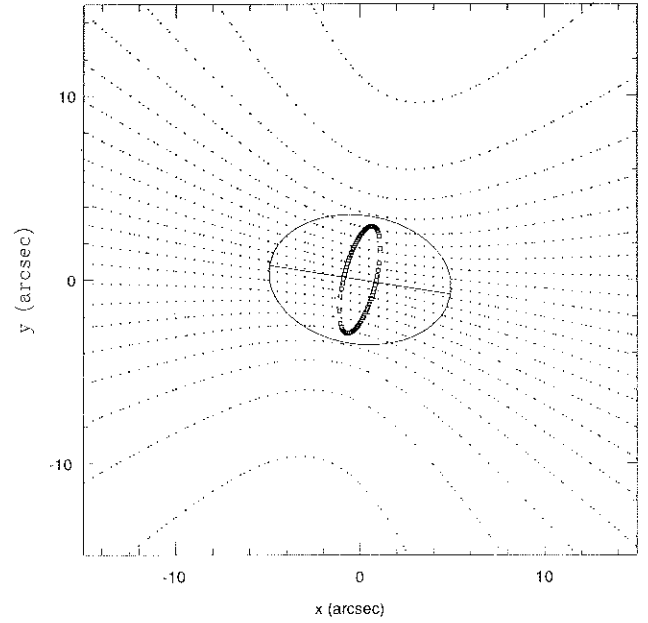
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 112.0$, $\theta = 52.0$
 Apparent axial ratio = 0.70, $pa = 99.2$, kinematic misalignment = 15.0



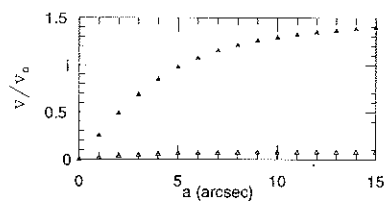
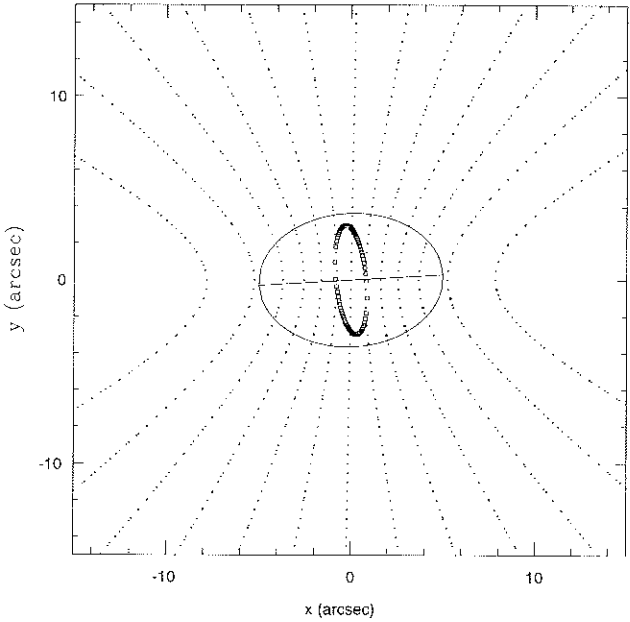
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=112.0$, $\theta=52.0$
Apparent axial ratio = 0.70, $pa=99.2$, kinematic misalignment =45.0



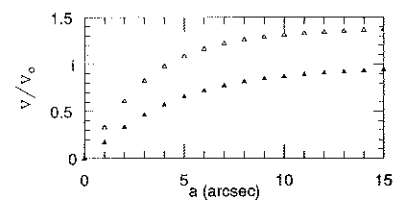
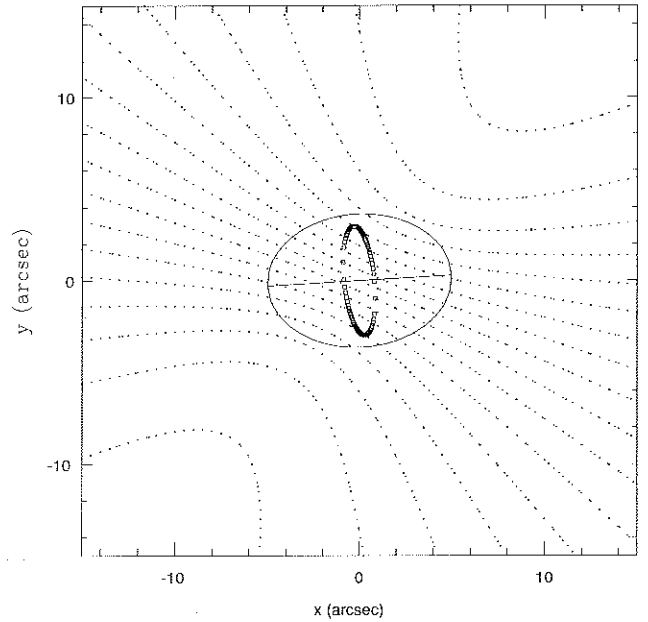
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=112.0$, $\theta=52.0$
Apparent axial ratio = 0.70, $pa=99.2$, kinematic misalignment =90.0

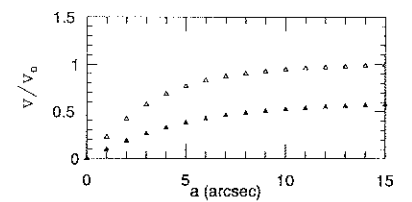
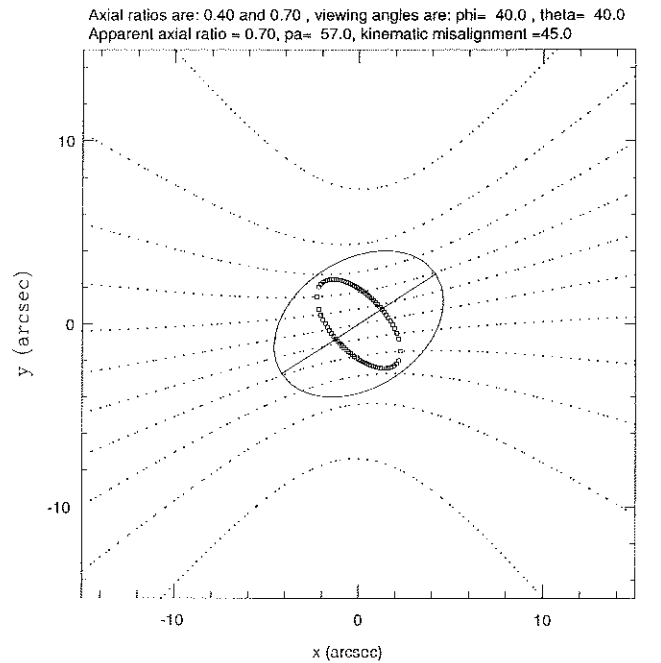
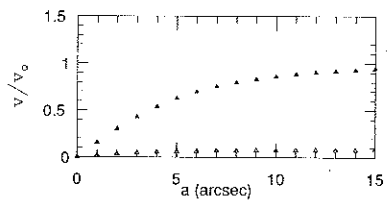
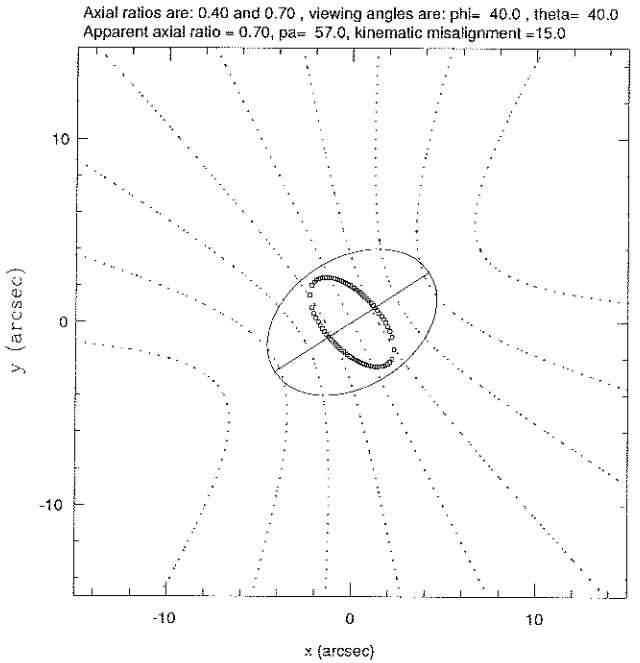
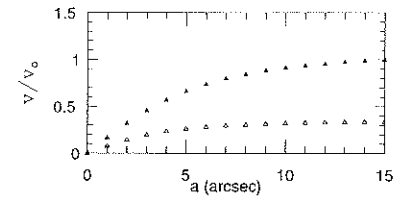
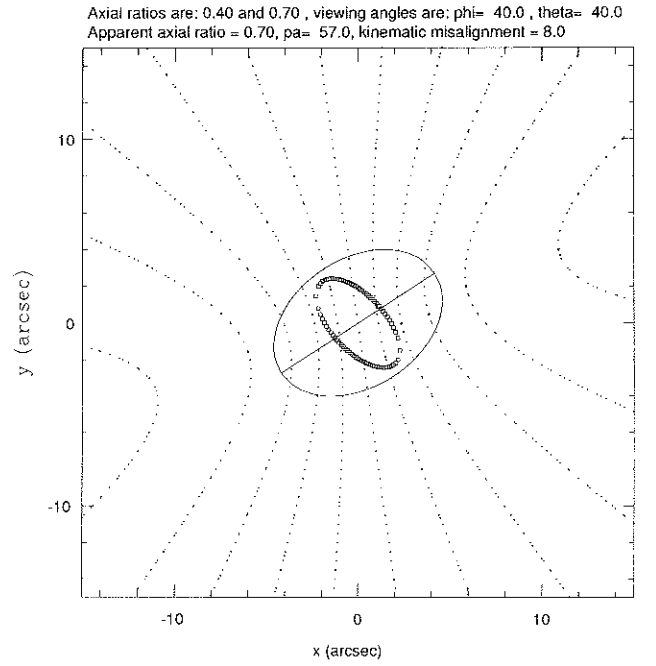
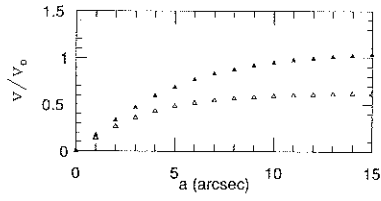
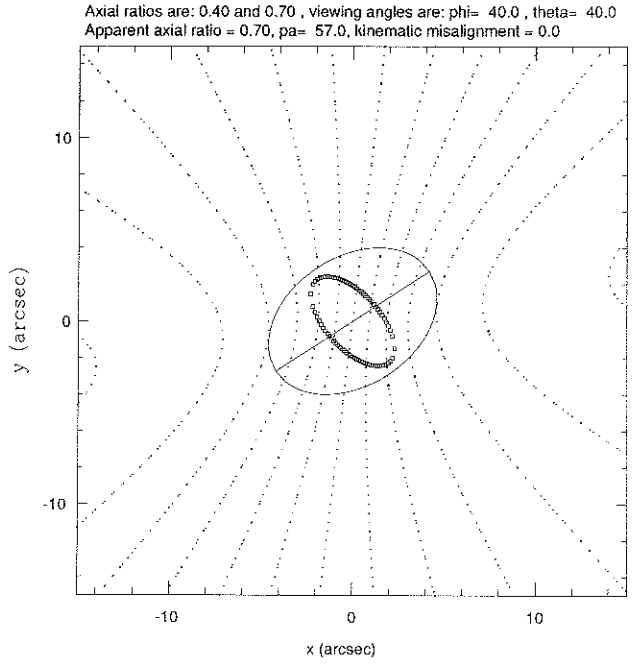


Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=73.0$, $\theta=70.0$
Apparent axial ratio = 0.73, $pa=86.7$, kinematic misalignment = 0.0

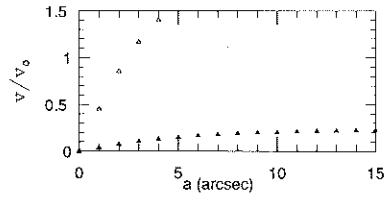
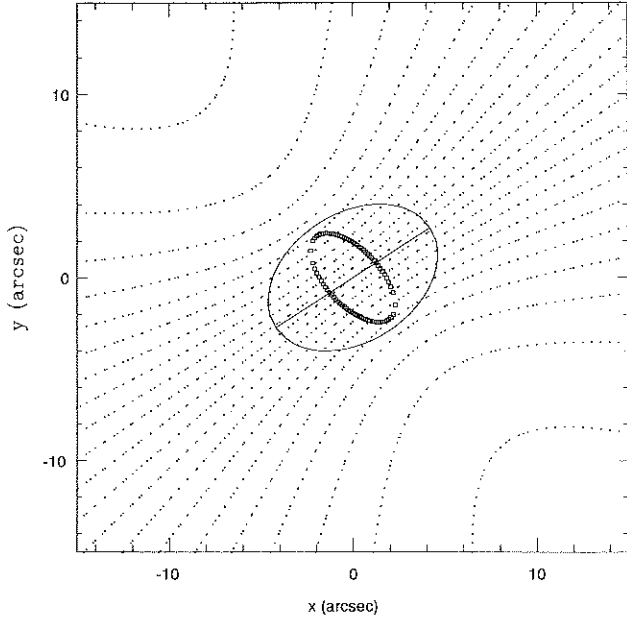


Axial ratios are: 0.70 and 0.85 , viewing angles are: $\phi=73.0$, $\theta=70.0$
Apparent axial ratio = 0.73, $pa=86.7$, kinematic misalignment =45.0

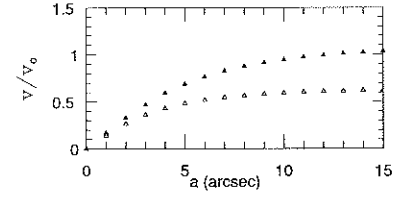
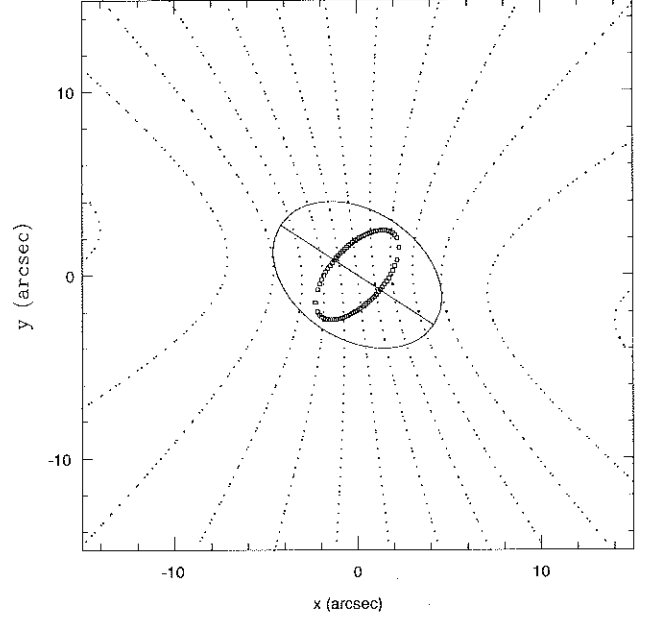




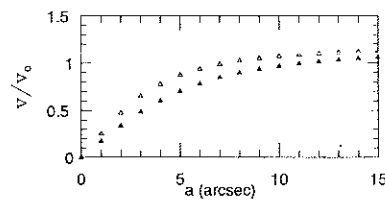
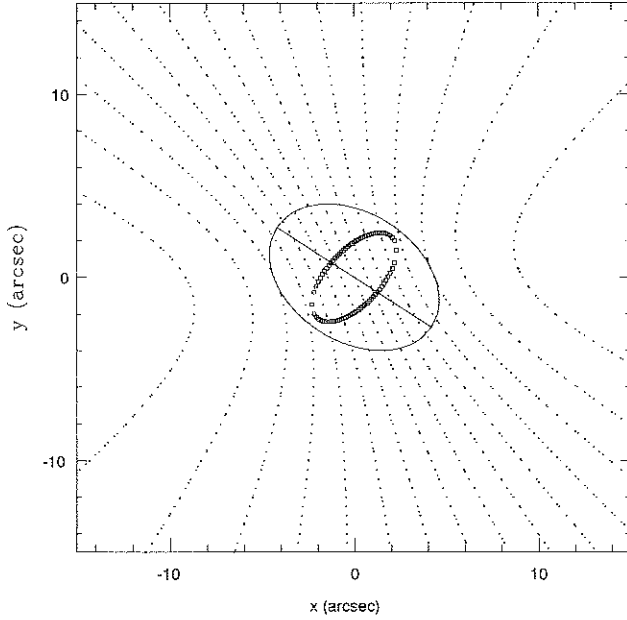
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = -40.0$, $\theta = 40.0$
 Apparent axial ratio = 0.70, $pa = 57.0$, kinematic misalignment = 90.0



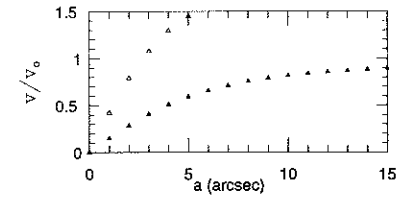
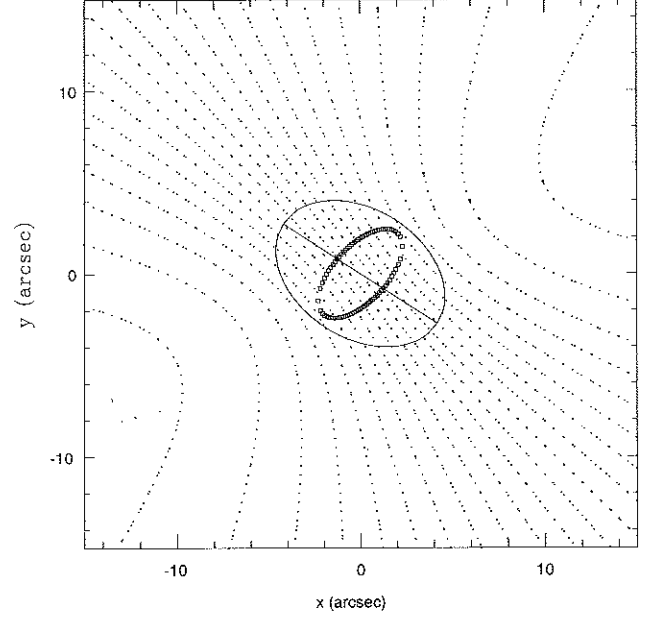
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 140.0$, $\theta = 40.0$
 Apparent axial ratio = 0.70, $pa = 123.0$, kinematic misalignment = 0.0



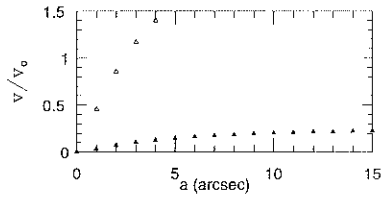
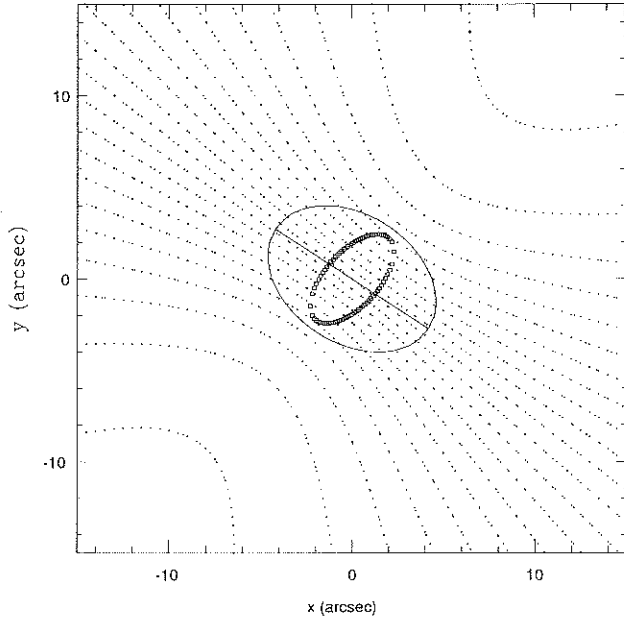
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 140.0$, $\theta = 40.0$
 Apparent axial ratio = 0.70, $pa = 123.0$, kinematic misalignment = 15.0



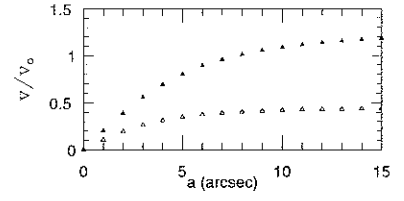
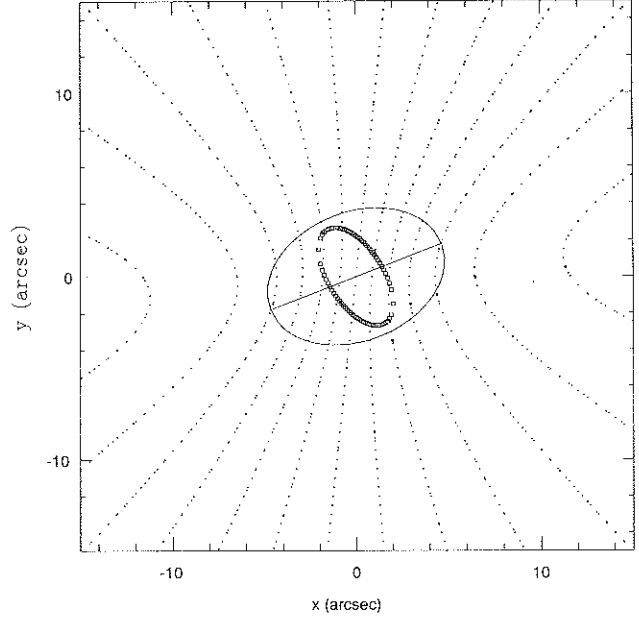
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 140.0$, $\theta = 40.0$
 Apparent axial ratio = 0.70, $pa = 123.0$, kinematic misalignment = 45.0



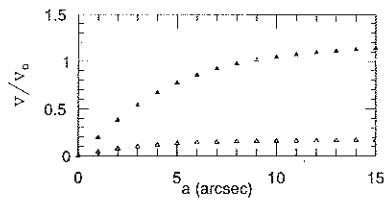
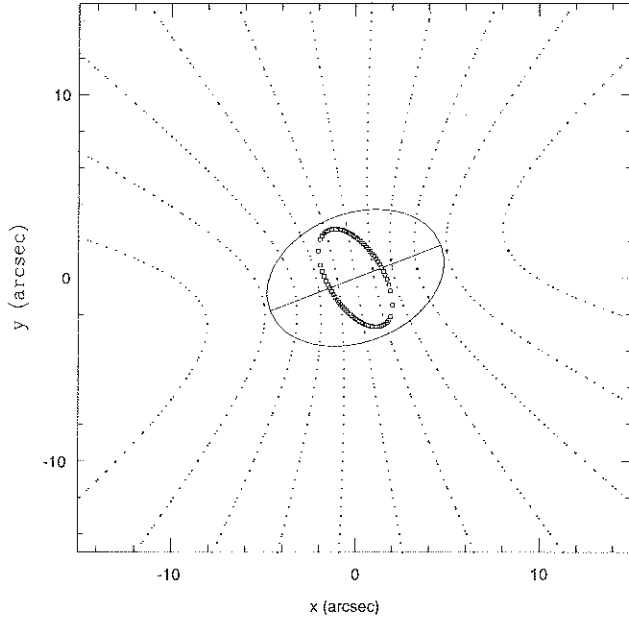
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi=140.0$, $\theta=40.0$
 Apparent axial ratio = 0.70, $pa=123.0$, kinematic misalignment = 90.0



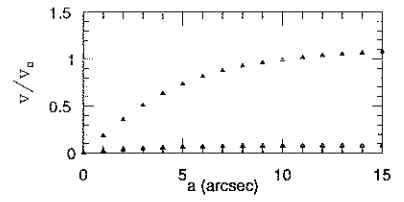
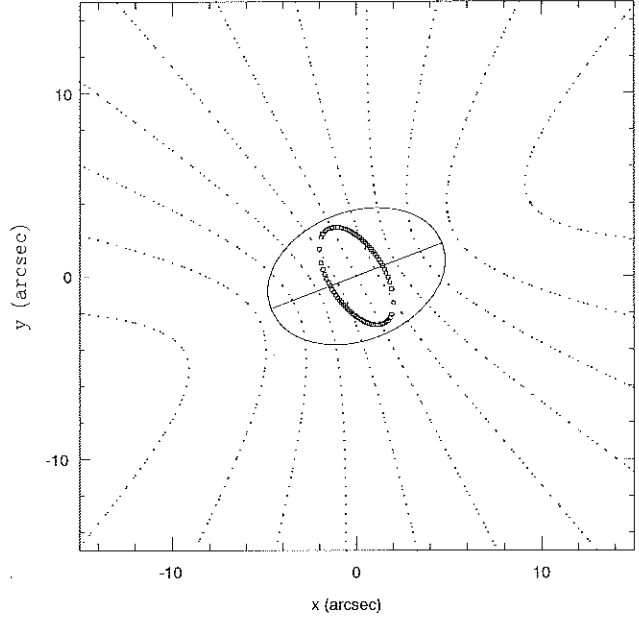
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=47.5$, $\theta=48.0$
 Apparent axial ratio = 0.70, $pa=68.9$, kinematic misalignment = 0.0



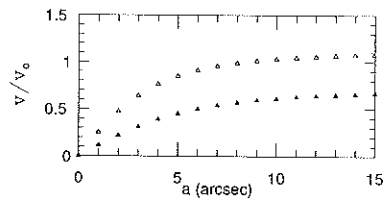
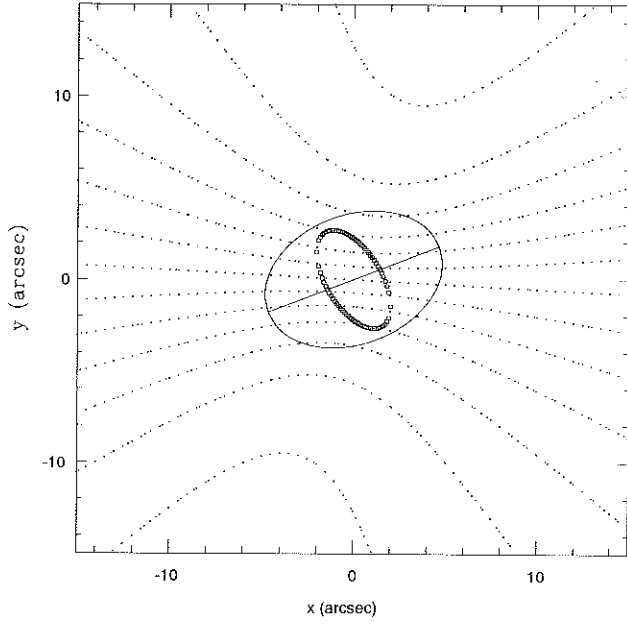
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=47.5$, $\theta=48.0$
 Apparent axial ratio = 0.70, $pa=68.9$, kinematic misalignment = 8.0



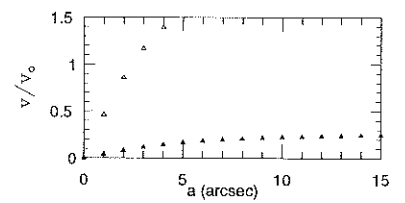
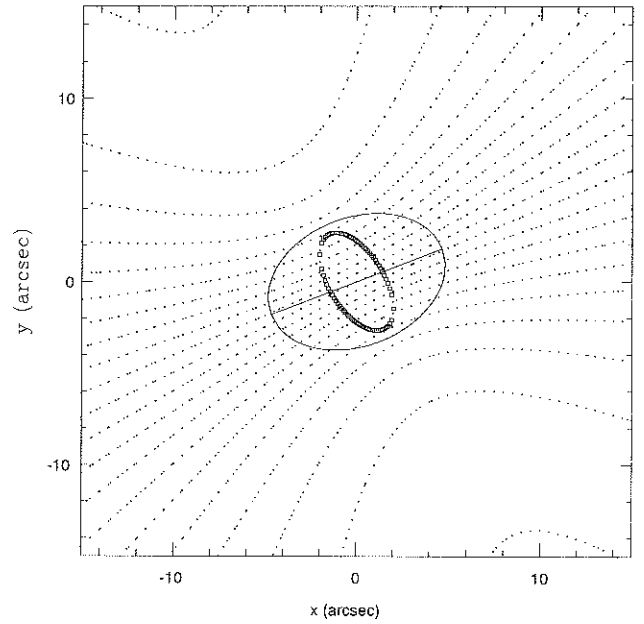
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=47.5$, $\theta=48.0$
 Apparent axial ratio = 0.70, $pa=68.9$, kinematic misalignment = 15.0



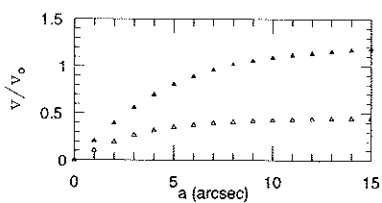
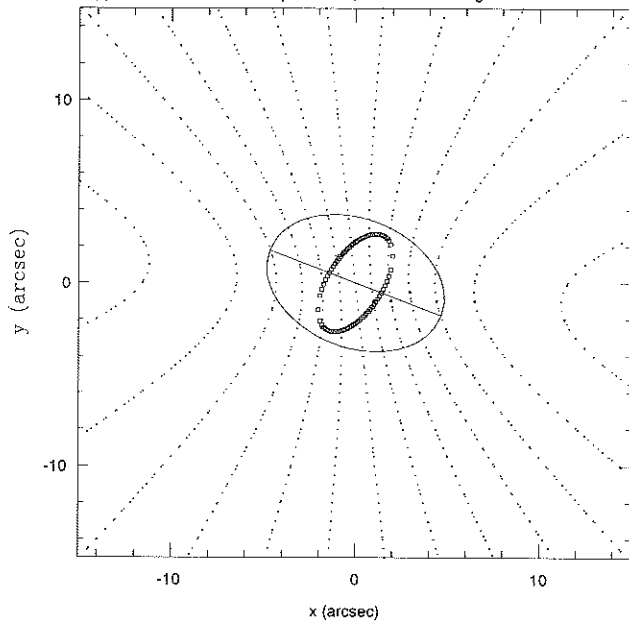
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 47.5^\circ$, $\theta = 48.0^\circ$
 Apparent axial ratio = 0.70, $pa = 68.9$, kinematic misalignment = 45.0°



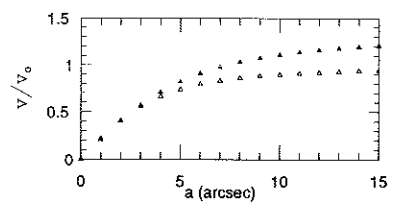
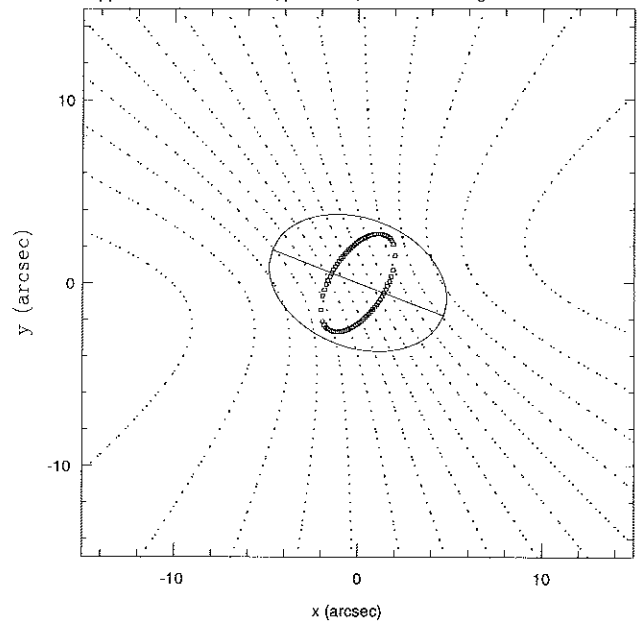
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 47.5^\circ$, $\theta = 48.0^\circ$
 Apparent axial ratio = 0.70, $pa = 68.9$, kinematic misalignment = 90.0°



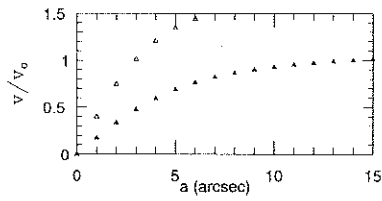
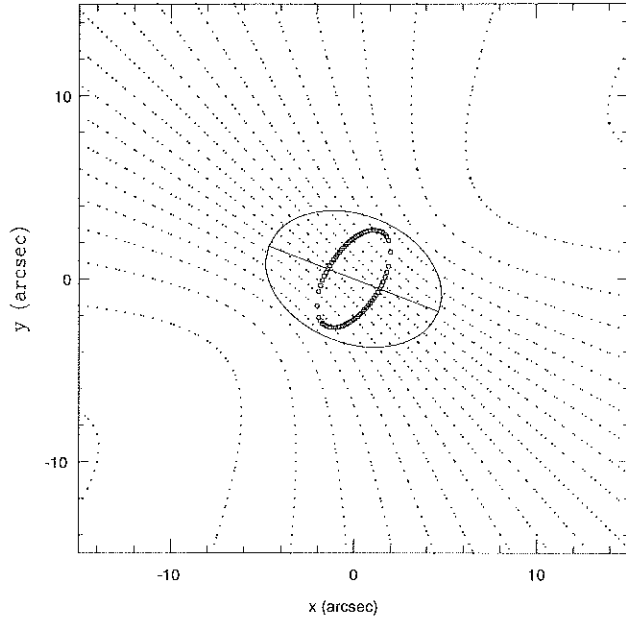
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 132.5^\circ$, $\theta = 48.0^\circ$
 Apparent axial ratio = 0.70, $pa = 111.1$, kinematic misalignment = 0.0°



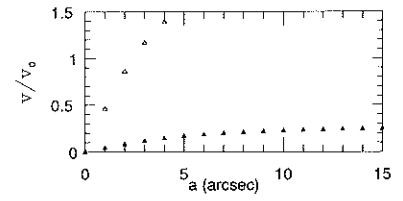
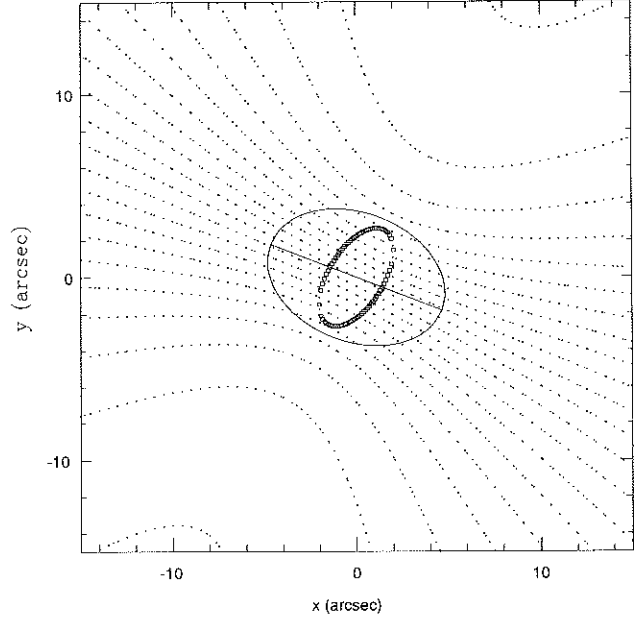
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 132.5^\circ$, $\theta = 48.0^\circ$
 Apparent axial ratio = 0.70, $pa = 111.1$, kinematic misalignment = 15.0°



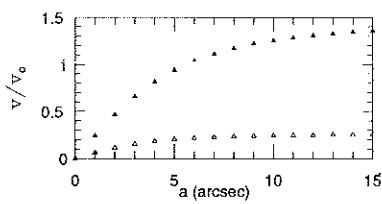
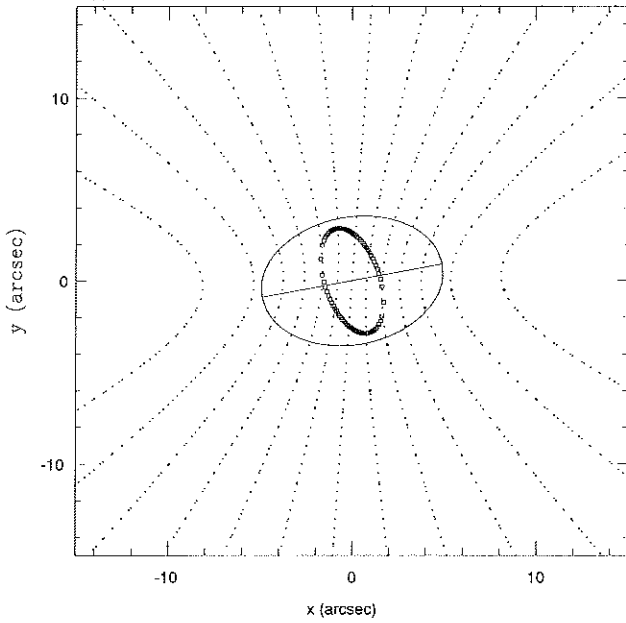
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=132.5$, $\theta=48.0$
 Apparent axial ratio = 0.70, $pa=111.1$, kinematic misalignment =45.0



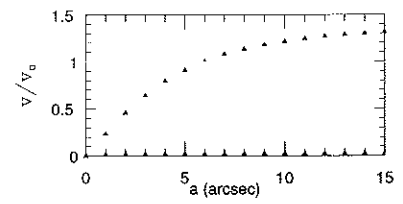
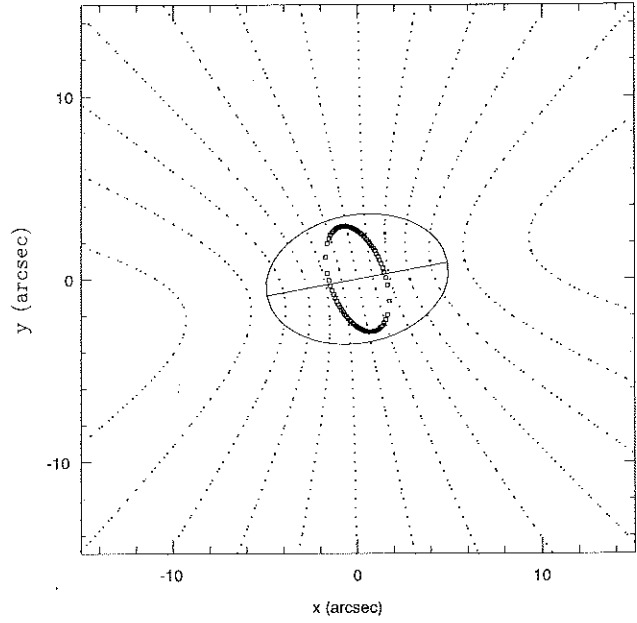
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=132.5$, $\theta=48.0$
 Apparent axial ratio = 0.70, $pa=111.1$, kinematic misalignment =90.0



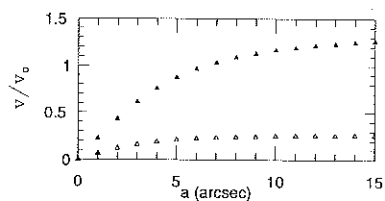
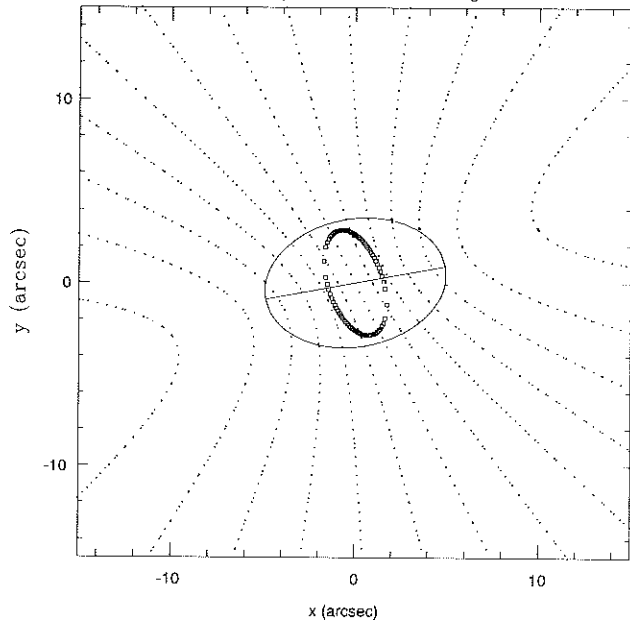
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=55.0$, $\theta=61.0$
 Apparent axial ratio = 0.70, $pa=79.5$, kinematic misalignment = 0.0



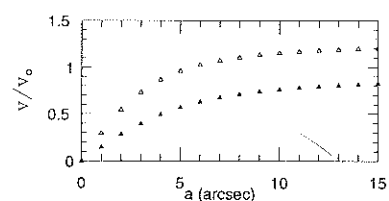
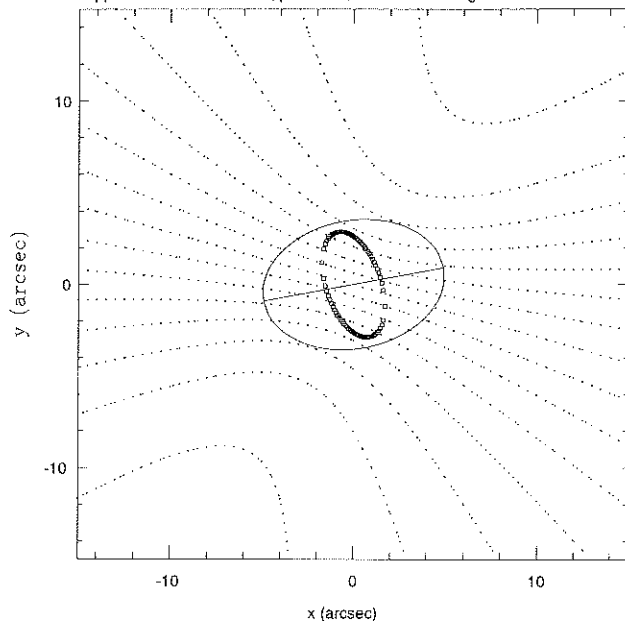
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=55.0$, $\theta=61.0$
 Apparent axial ratio = 0.70, $pa=79.5$, kinematic misalignment = 8.0



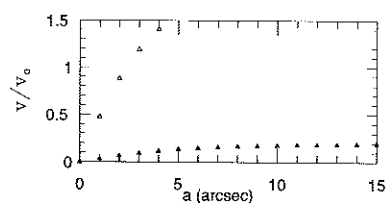
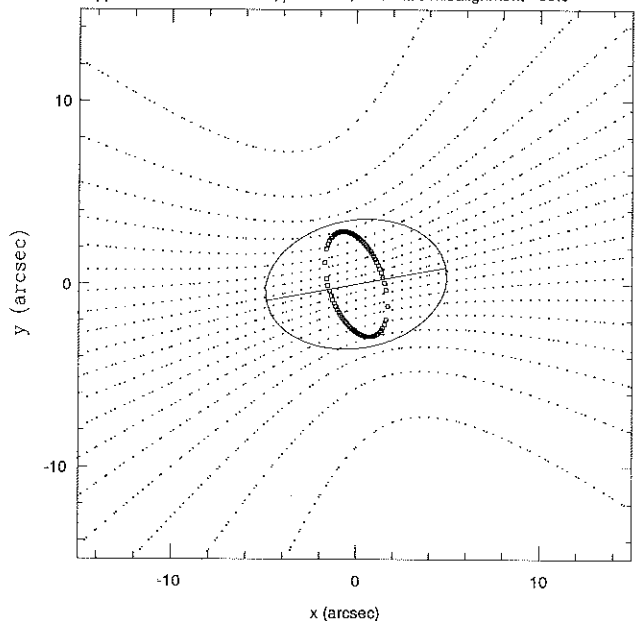
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 55.0$, $\theta = 61.0$
 Apparent axial ratio = 0.70, $\phi_a = 79.5$, kinematic misalignment = 15.0



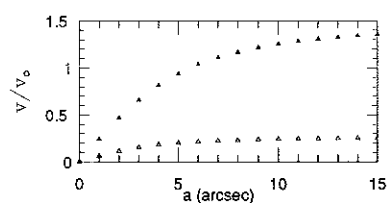
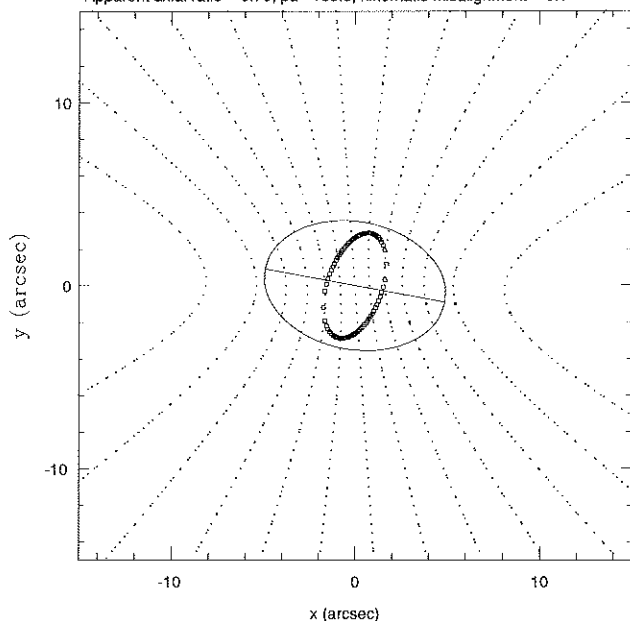
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 55.0$, $\theta = 61.0$
 Apparent axial ratio = 0.70, $\phi_a = 79.5$, kinematic misalignment = 45.0



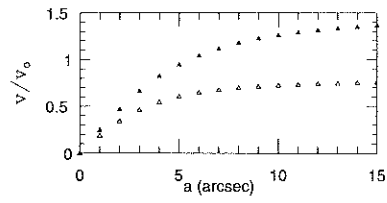
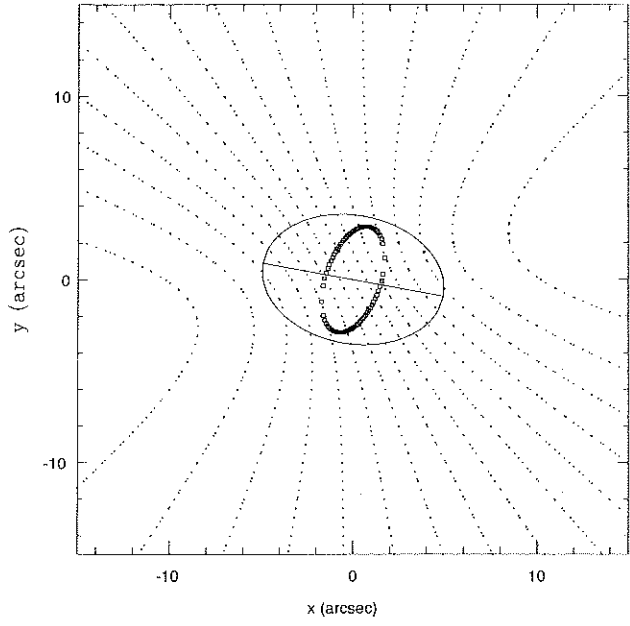
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 55.0$, $\theta = 61.0$
 Apparent axial ratio = 0.70, $\phi_a = 79.5$, kinematic misalignment = 90.0



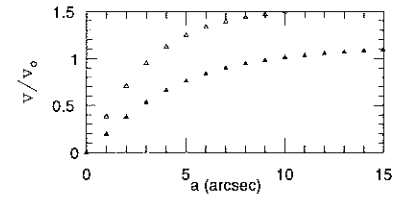
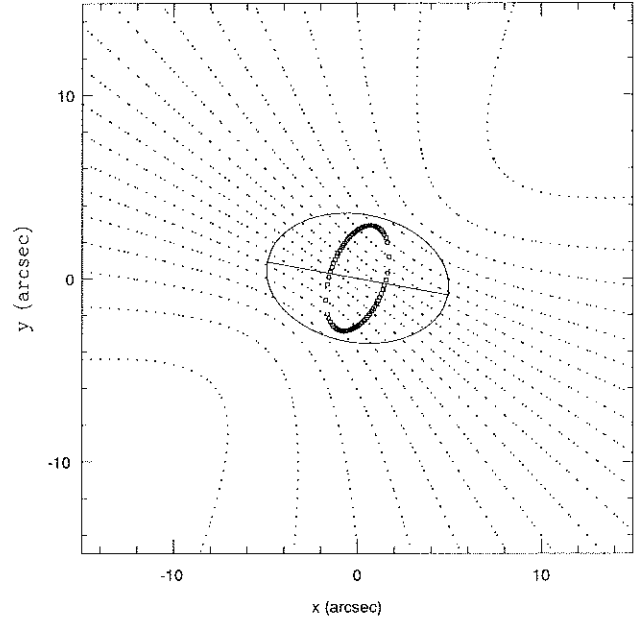
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi = 125.0$, $\theta = 61.0$
 Apparent axial ratio = 0.70, $\phi_a = 100.5$, kinematic misalignment = 0.0



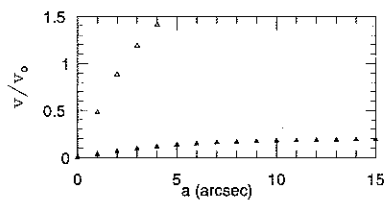
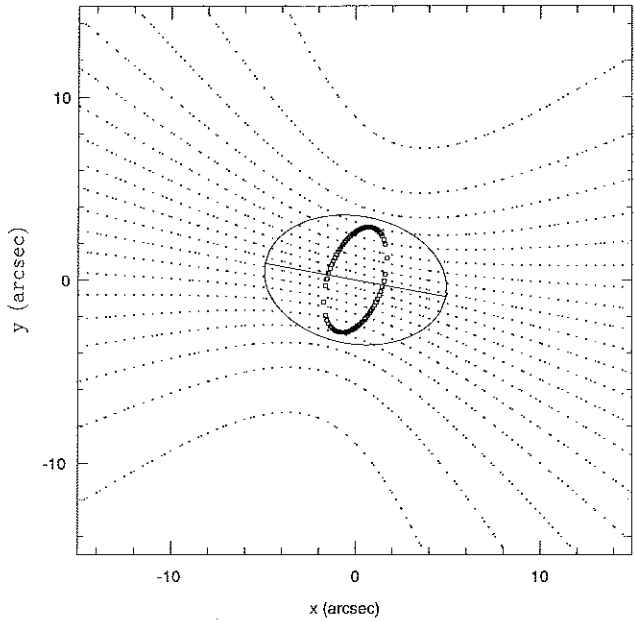
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=125.0$, $\theta=61.0$
 Apparent axial ratio = 0.70, $pa=100.5$, kinematic misalignment =15.0



Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=125.0$, $\theta=61.0$
 Apparent axial ratio = 0.70, $pa=100.5$, kinematic misalignment =45.0

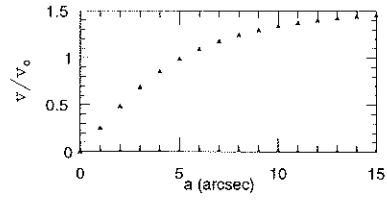
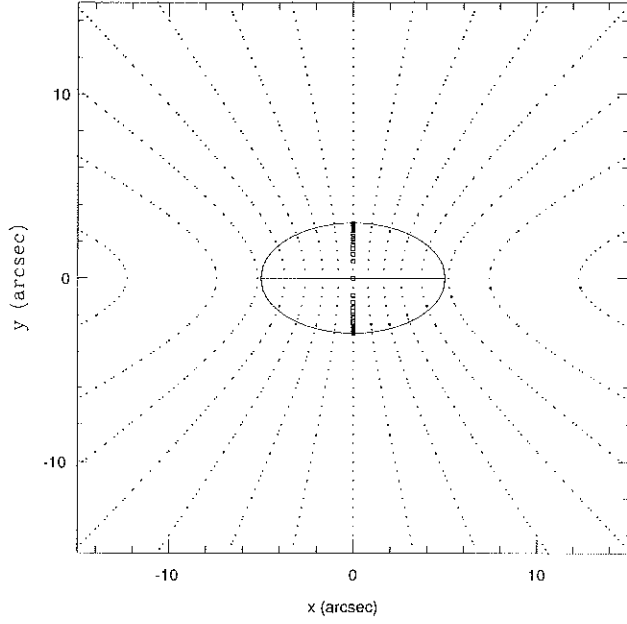


Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=125.0$, $\theta=61.0$
 Apparent axial ratio = 0.70, $pa=100.5$, kinematic misalignment =90.0

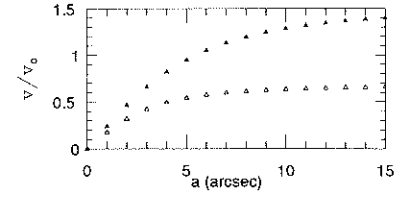
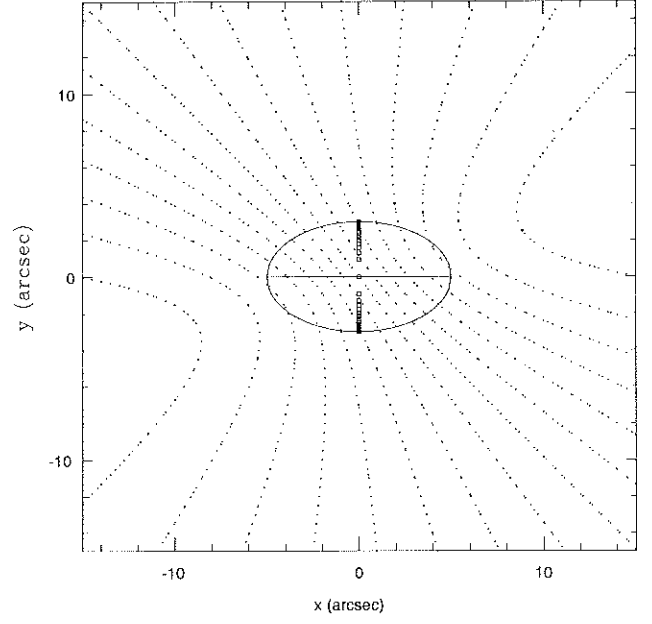


E4 GALAXIES

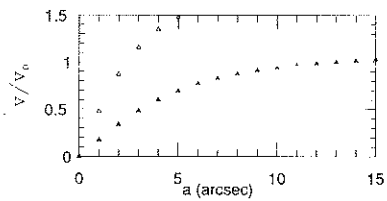
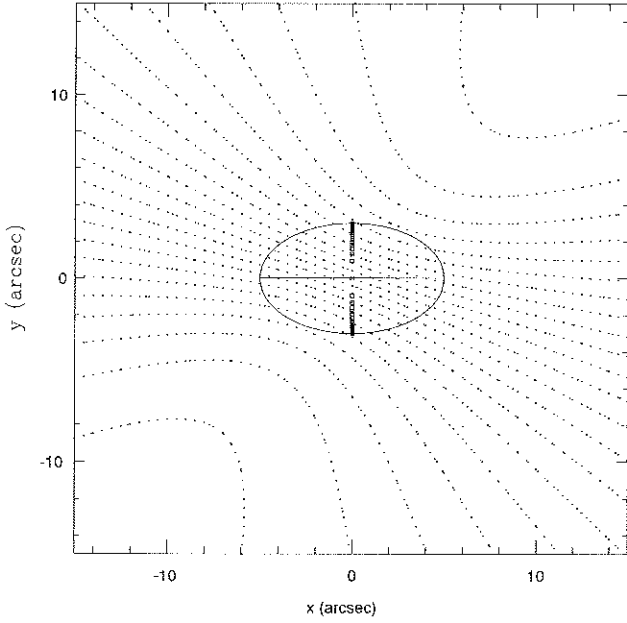
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=90.0$, $\theta=90.0$
Apparent axial ratio = 0.60, $pa=90.0$, kinematic misalignment = 0.0



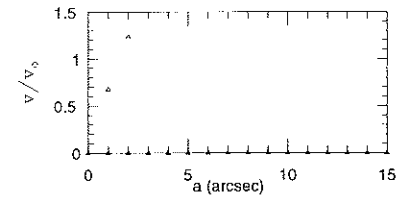
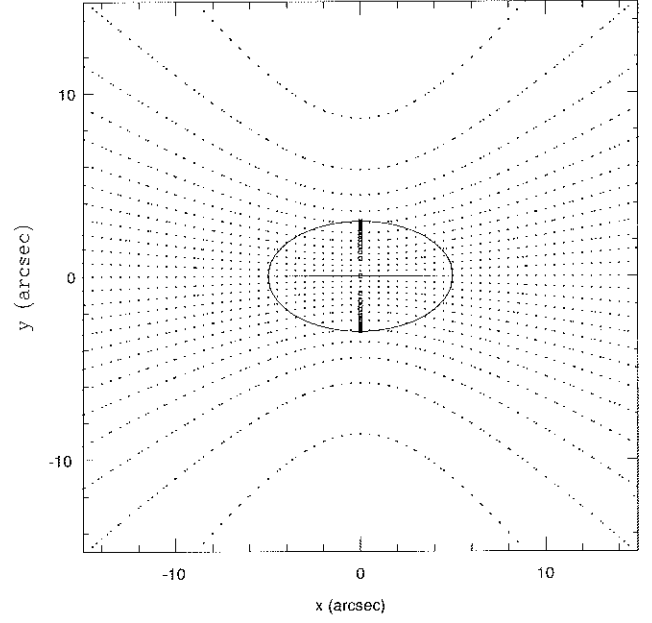
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=90.0$, $\theta=90.0$
Apparent axial ratio = 0.60, $pa=90.0$, kinematic misalignment = 15.0



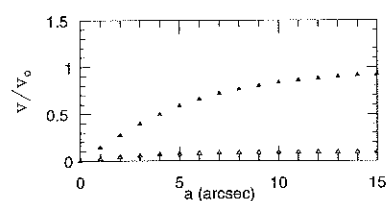
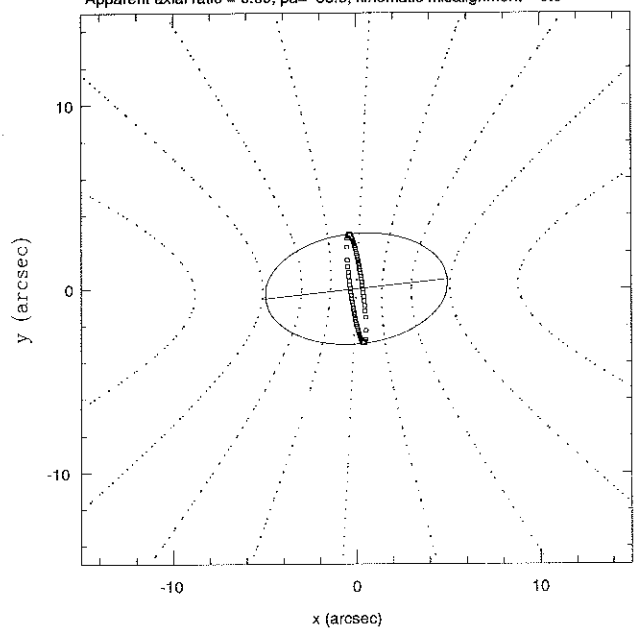
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=90.0$, $\theta=90.0$
Apparent axial ratio = 0.60, $pa=90.0$, kinematic misalignment = 45.0



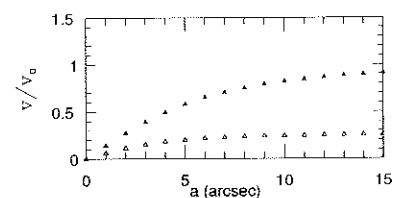
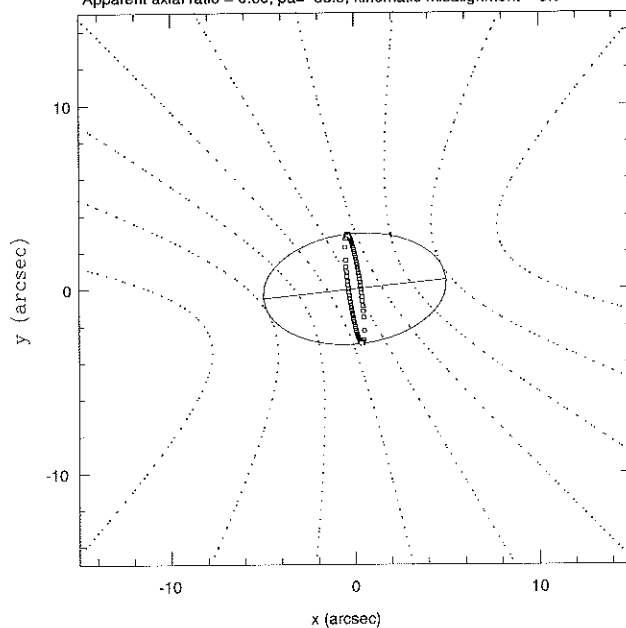
Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=90.0$, $\theta=90.0$
Apparent axial ratio = 0.60, $pa=90.0$, kinematic misalignment = 90.0



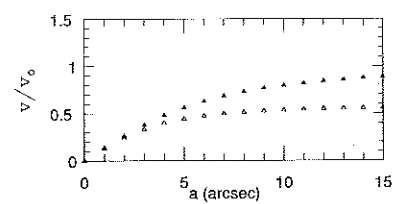
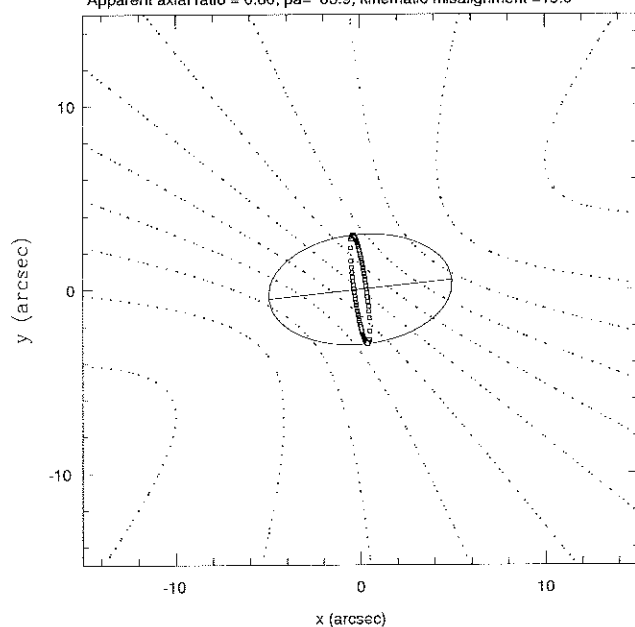
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 80.0$, $\theta = 40.0$
Apparent axial ratio = 0.60, $pa = 83.9$, kinematic misalignment = 0.0



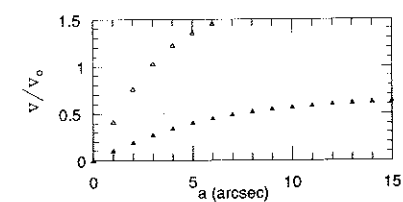
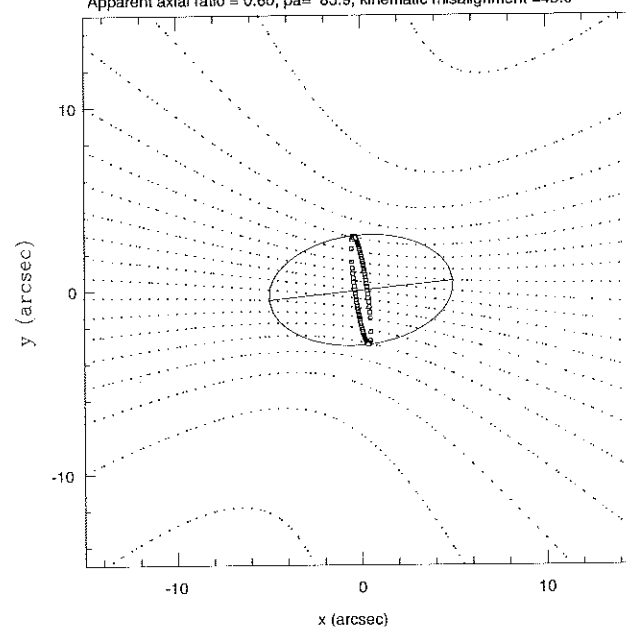
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 80.0$, $\theta = 40.0$
Apparent axial ratio = 0.60, $pa = 83.9$, kinematic misalignment = 8.0



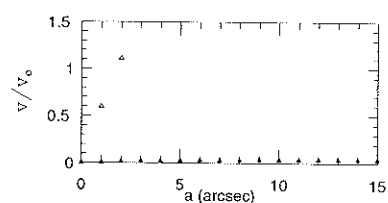
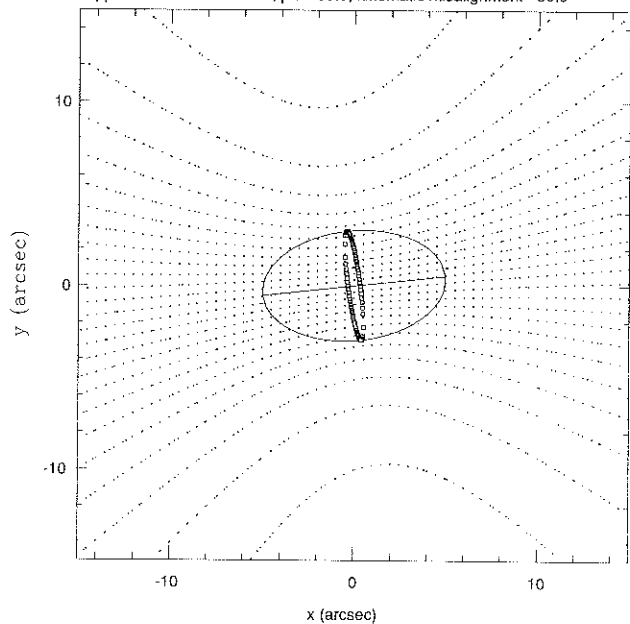
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 80.0$, $\theta = 40.0$
Apparent axial ratio = 0.60, $pa = 83.9$, kinematic misalignment = 15.0



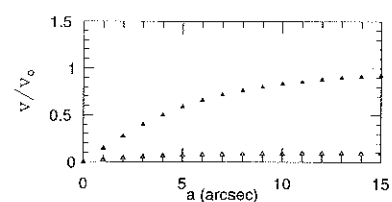
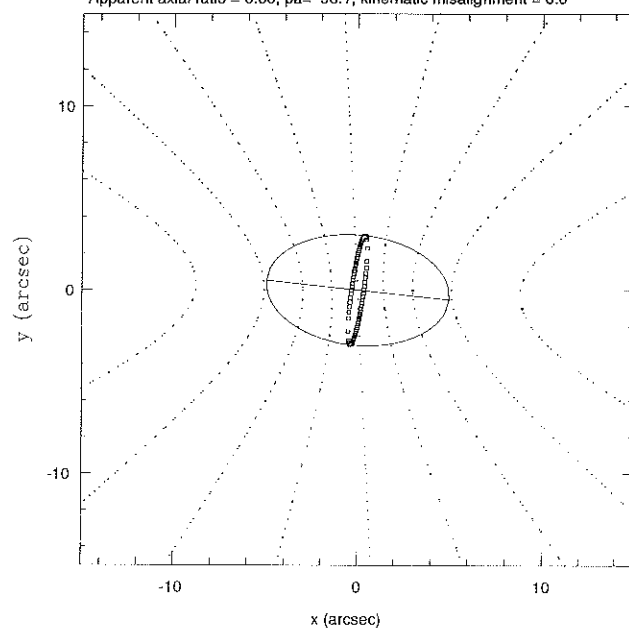
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 80.0$, $\theta = 40.0$
Apparent axial ratio = 0.60, $pa = 83.9$, kinematic misalignment = 45.0



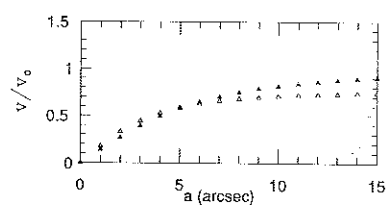
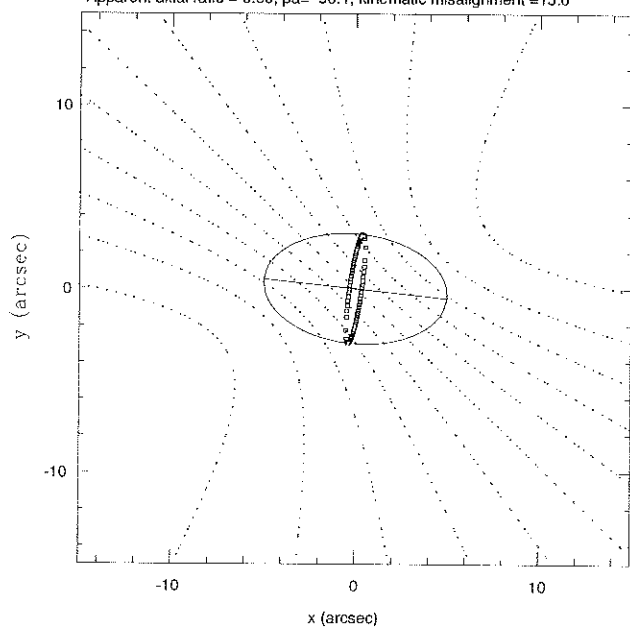
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 80.0$, $\theta= 40.0$
Apparent axial ratio = 0.60, $pa= 83.9$, kinematic misalignment =90.0



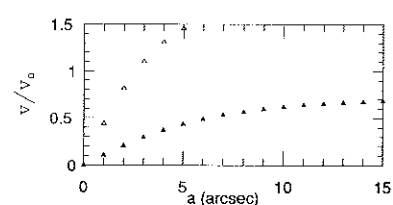
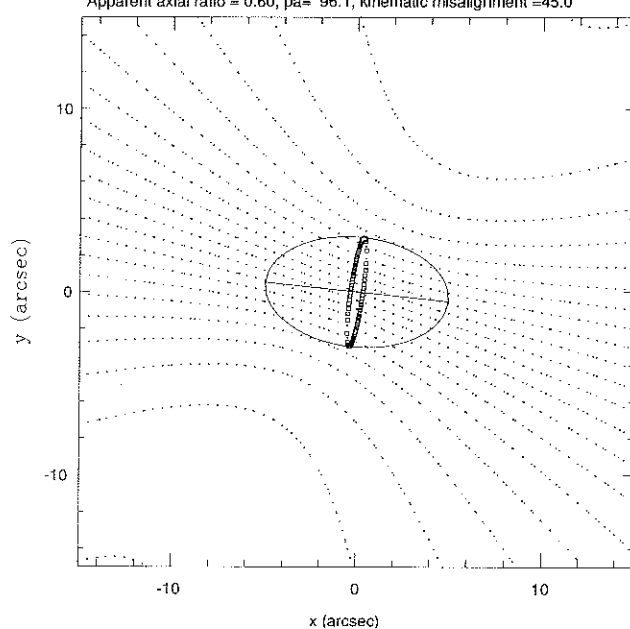
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 100.0$, $\theta= 40.0$
Apparent axial ratio = 0.60, $pa= 96.1$, kinematic misalignment = 0.0

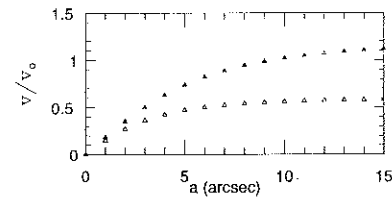
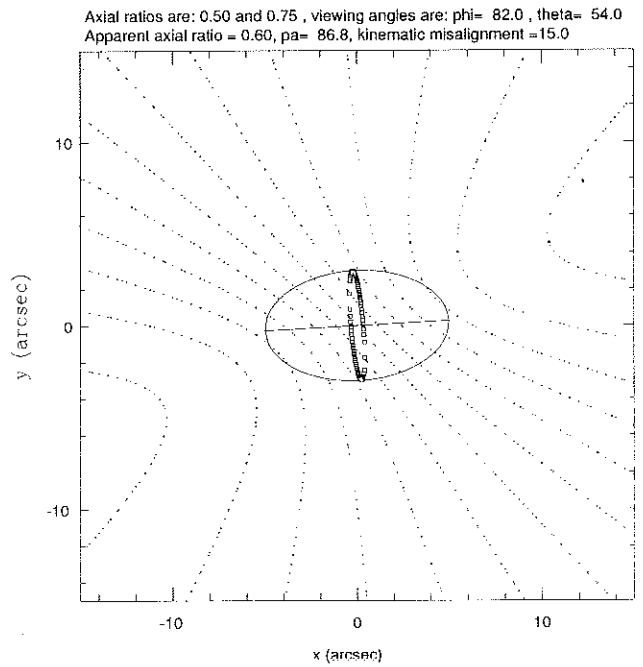
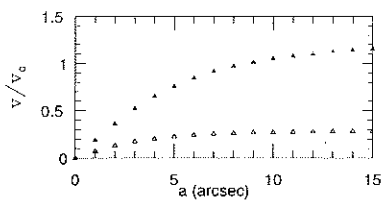
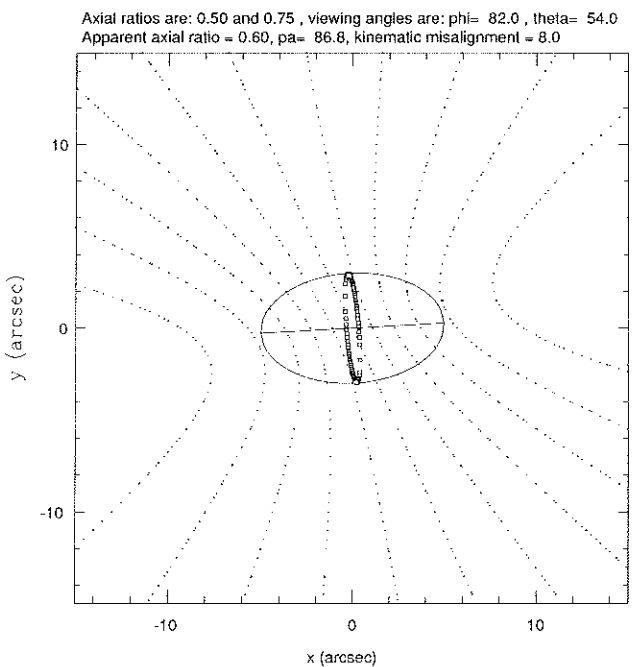
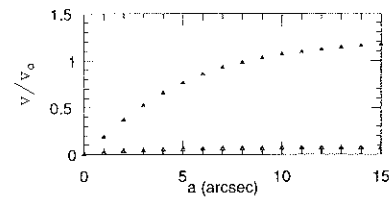
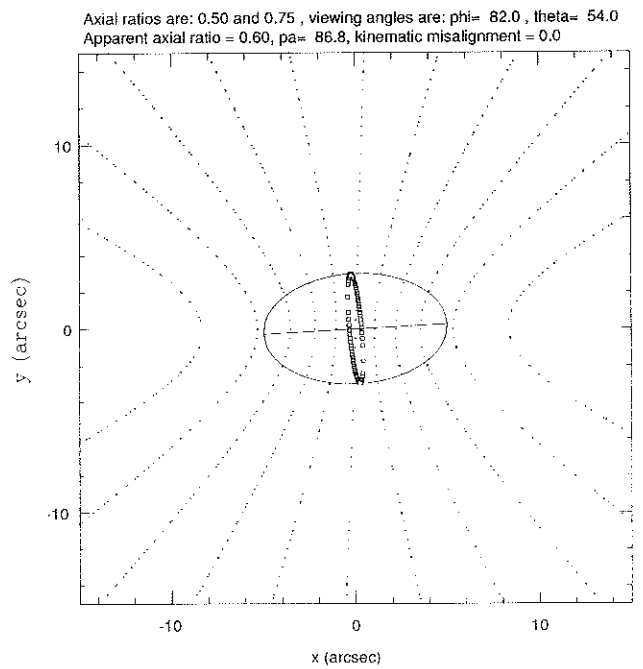
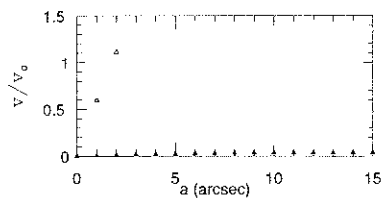
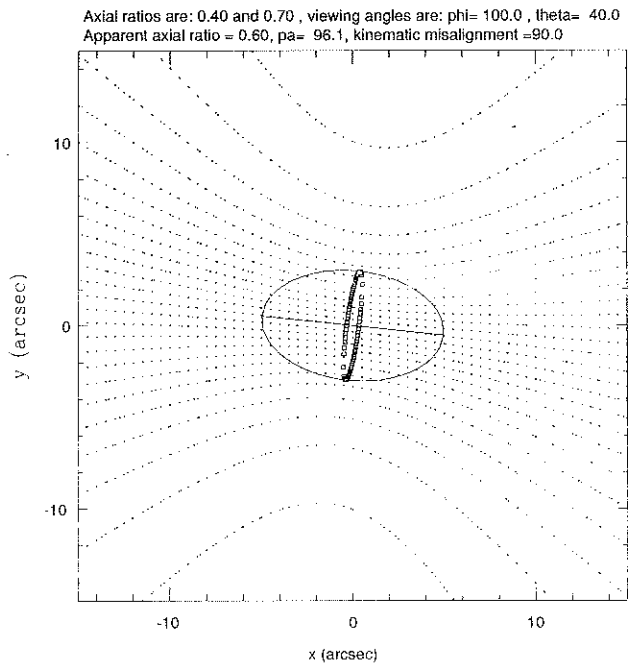


Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 100.0$, $\theta= 40.0$
Apparent axial ratio = 0.60, $pa= 96.1$, kinematic misalignment =15.0

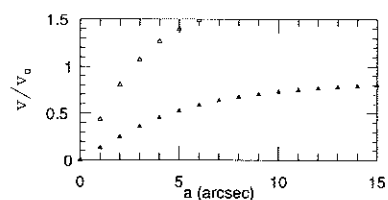
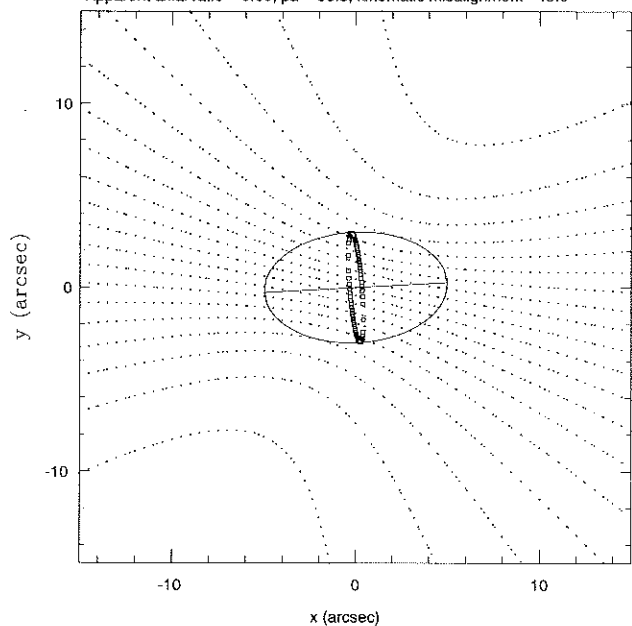


Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 100.0$, $\theta= 40.0$
Apparent axial ratio = 0.60, $pa= 96.1$, kinematic misalignment =45.0

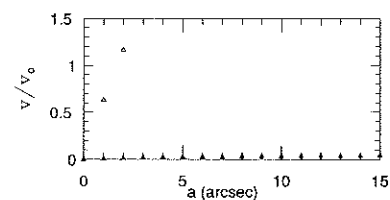
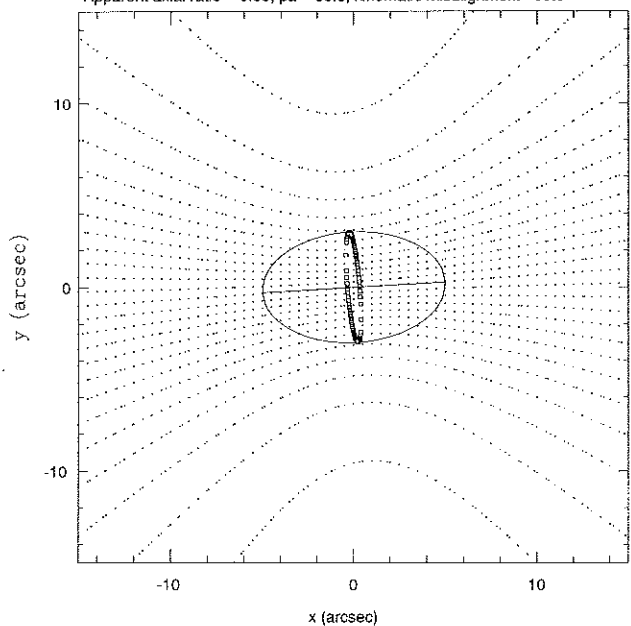




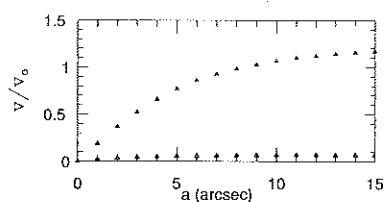
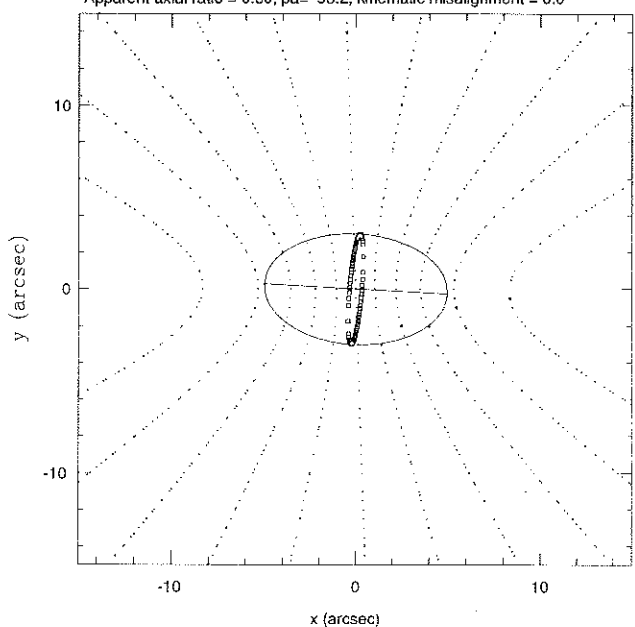
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 82.0$, $\theta = 54.0$
Apparent axial ratio = 0.60, $pa = 86.8$, kinematic misalignment = 45.0



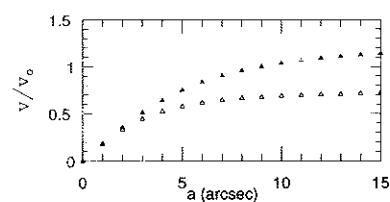
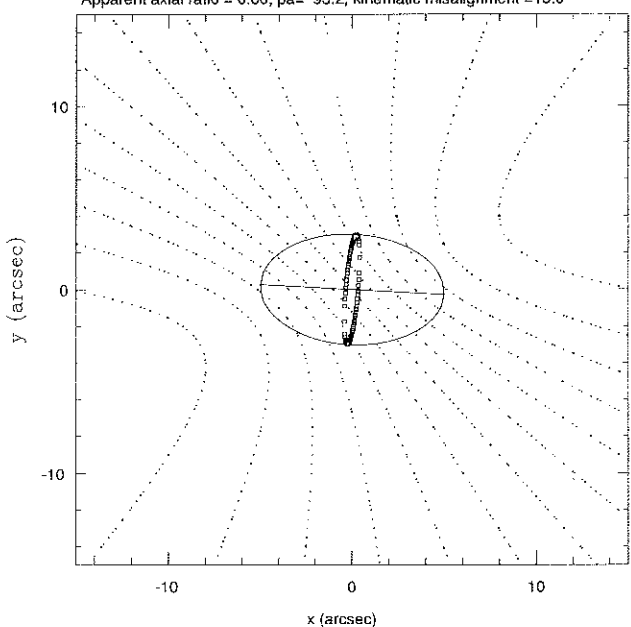
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 82.0$, $\theta = 54.0$
Apparent axial ratio = 0.60, $pa = 86.8$, kinematic misalignment = 90.0

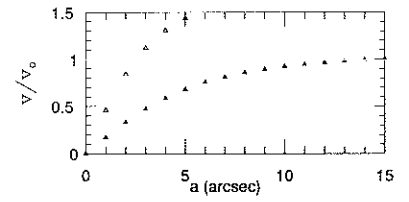
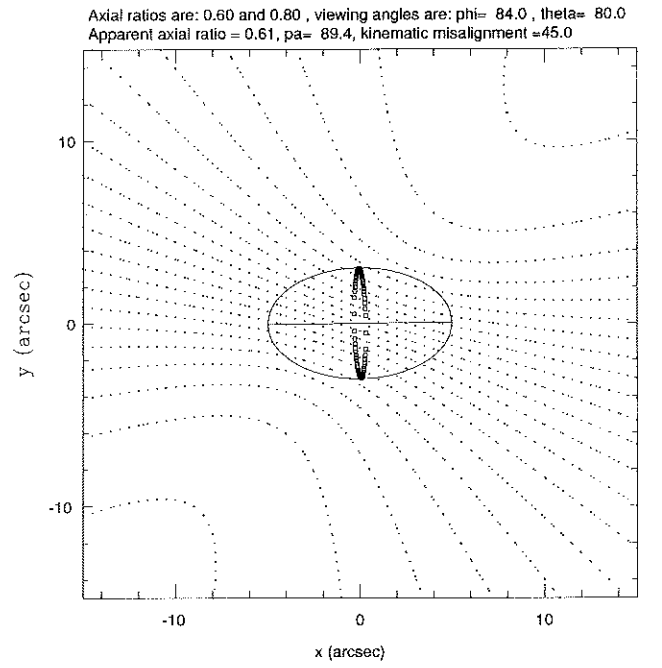
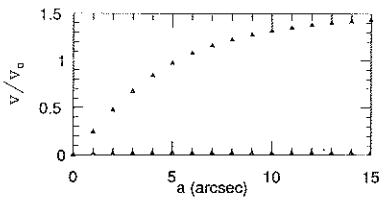
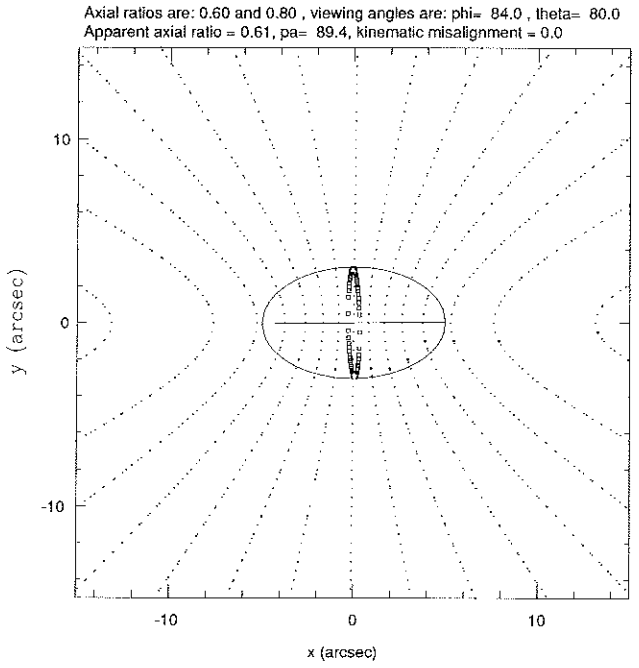
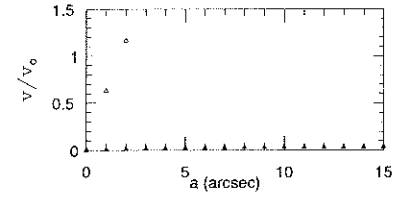
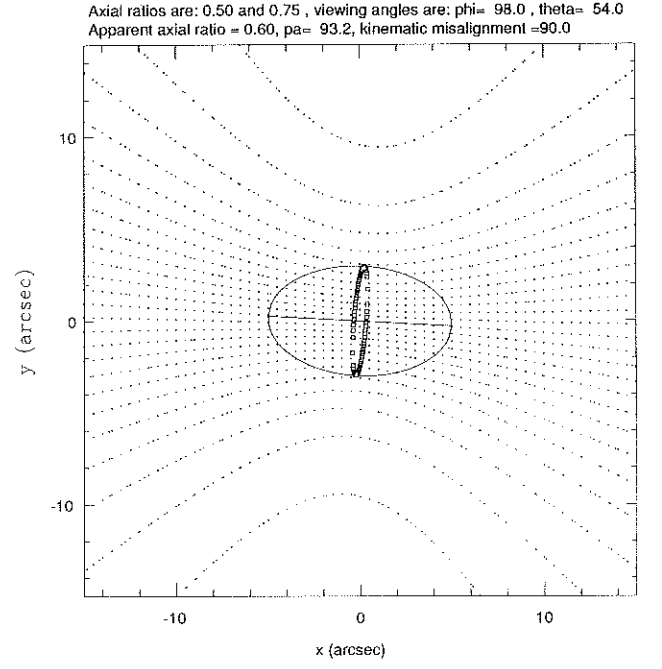
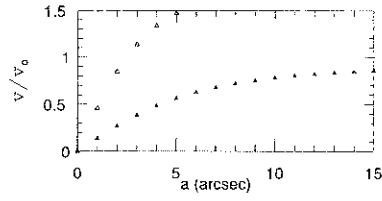
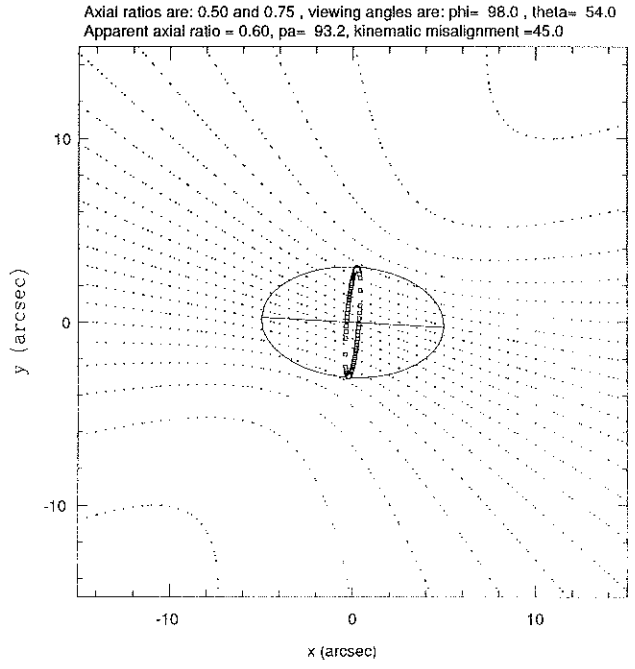


Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 98.0$, $\theta = 54.0$
Apparent axial ratio = 0.60, $pa = 93.2$, kinematic misalignment = 0.0

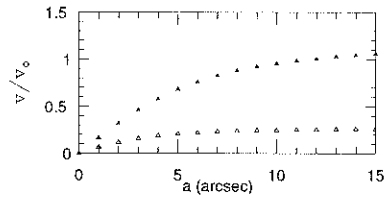
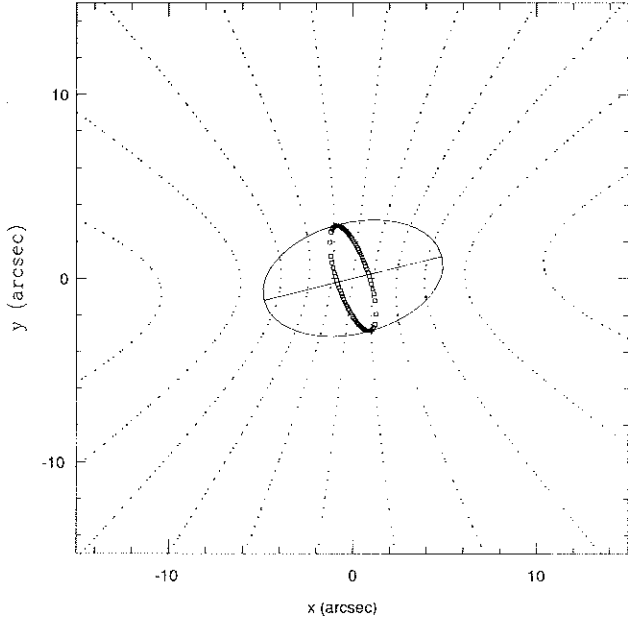


Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 98.0$, $\theta = 54.0$
Apparent axial ratio = 0.60, $pa = 93.2$, kinematic misalignment = 15.0

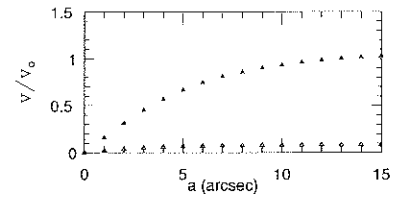
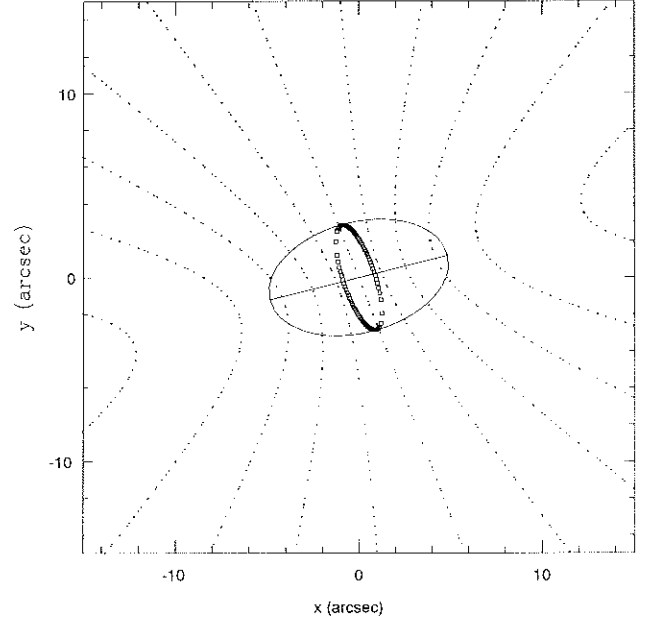




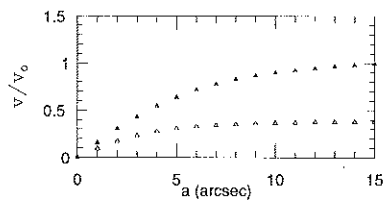
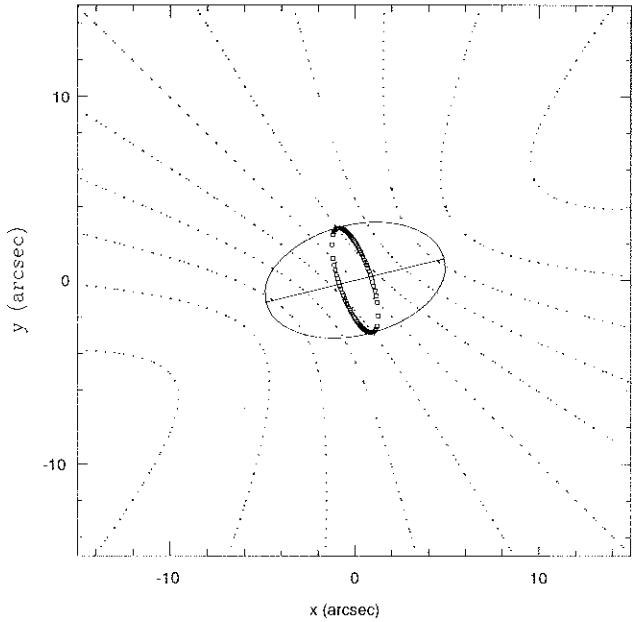
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 65.0$, $\theta= 44.0$
Apparent axial ratio = 0.60, $pa= 76.1$, kinematic misalignment = 0.0



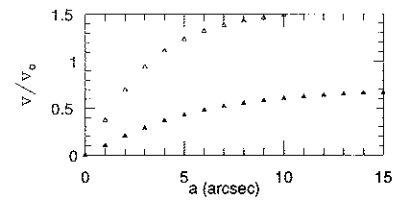
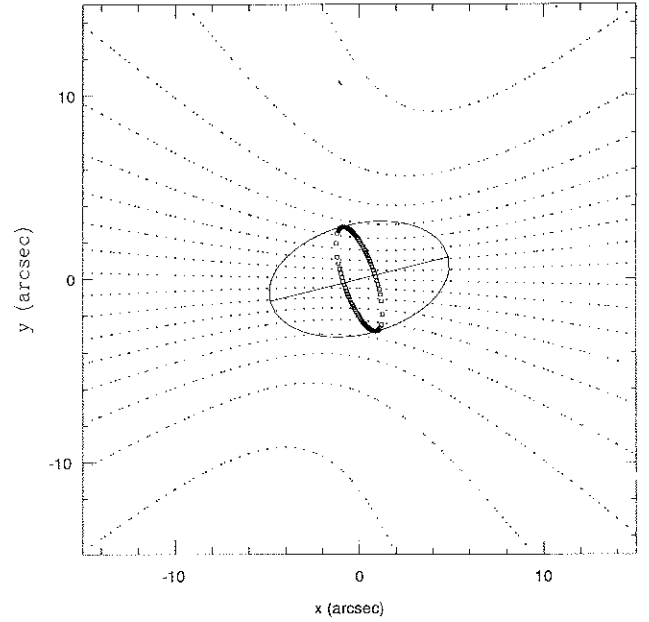
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 65.0$, $\theta= 44.0$
Apparent axial ratio = 0.60, $pa= 76.1$, kinematic misalignment = 8.0



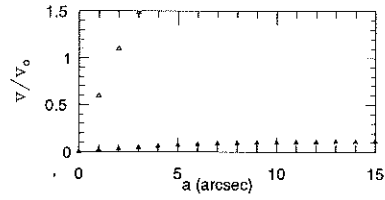
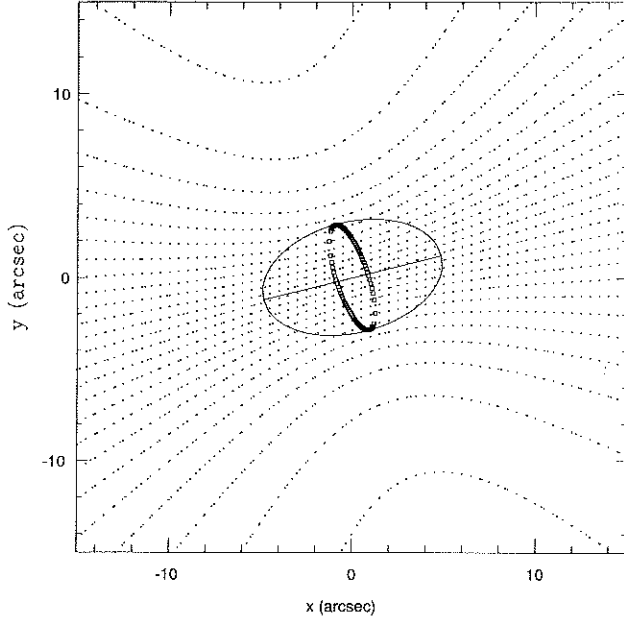
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 65.0$, $\theta= 44.0$
Apparent axial ratio = 0.60, $pa= 76.1$, kinematic misalignment = 15.0



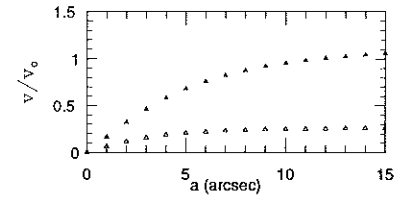
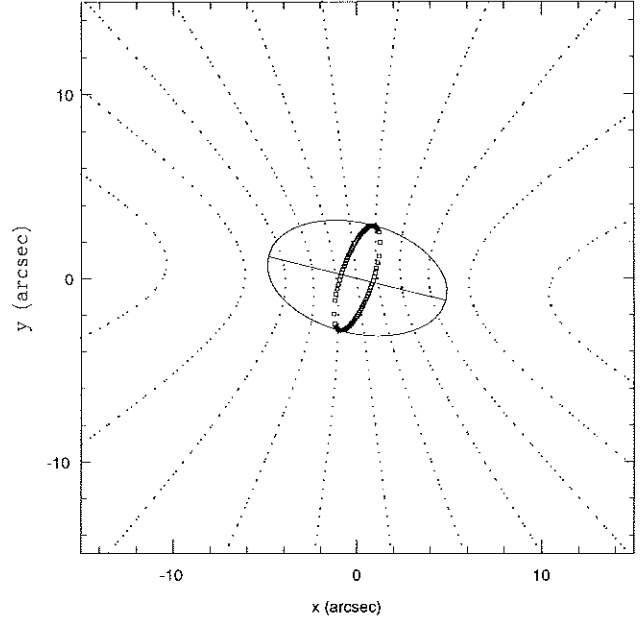
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 65.0$, $\theta= 44.0$
Apparent axial ratio = 0.60, $pa= 76.1$, kinematic misalignment = 45.0



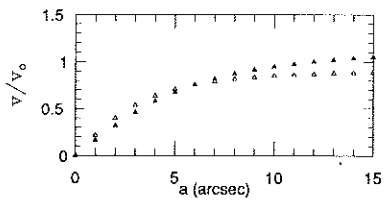
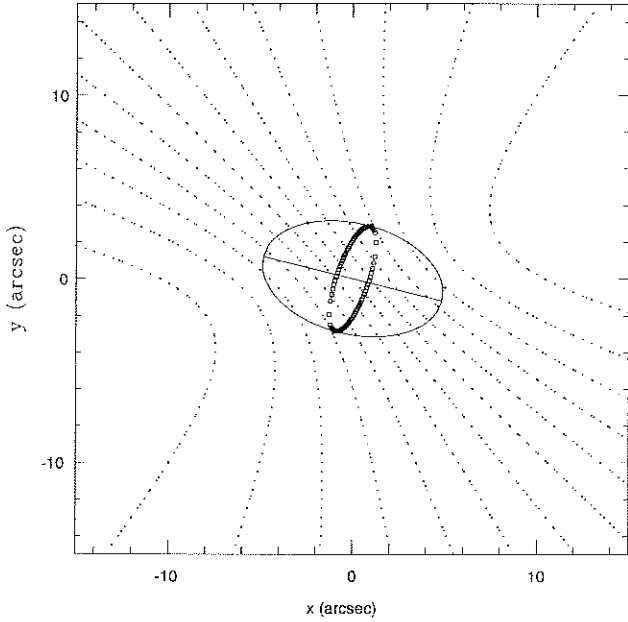
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 65.0$, $\theta = 44.0$
 Apparent axial ratio = 0.60, $p_a = 76.1$, kinematic misalignment = 90.0



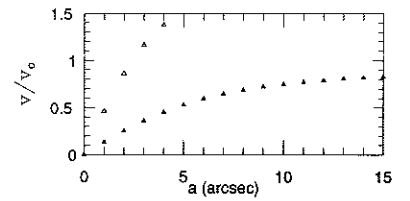
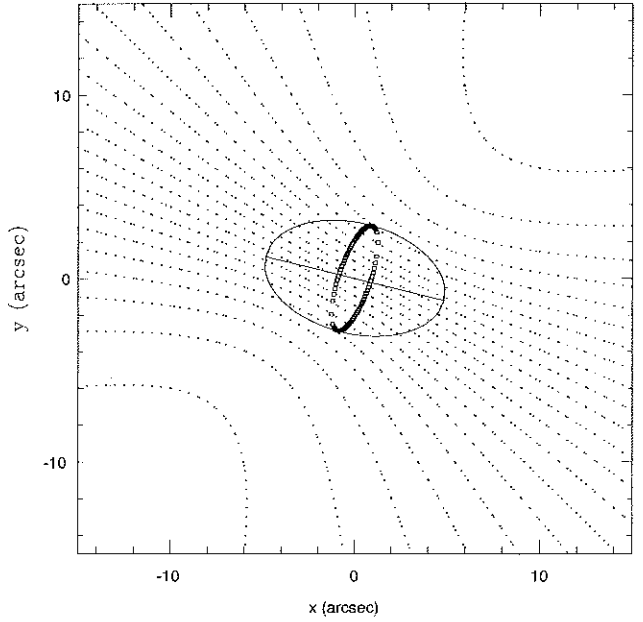
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 115.0$, $\theta = 44.0$
 Apparent axial ratio = 0.60, $p_a = 103.9$, kinematic misalignment = 0.0



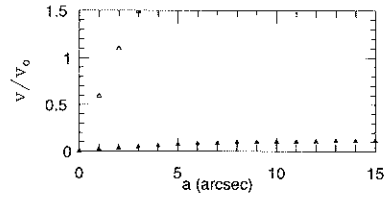
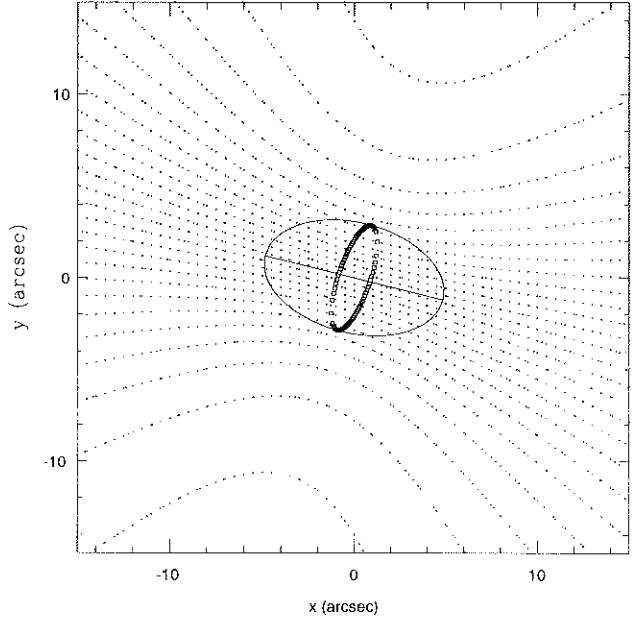
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 115.0$, $\theta = 44.0$
 Apparent axial ratio = 0.60, $p_a = 103.9$, kinematic misalignment = 15.0



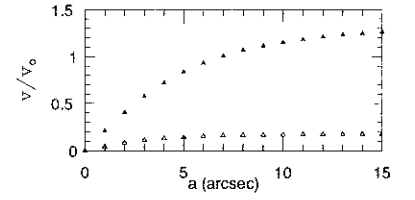
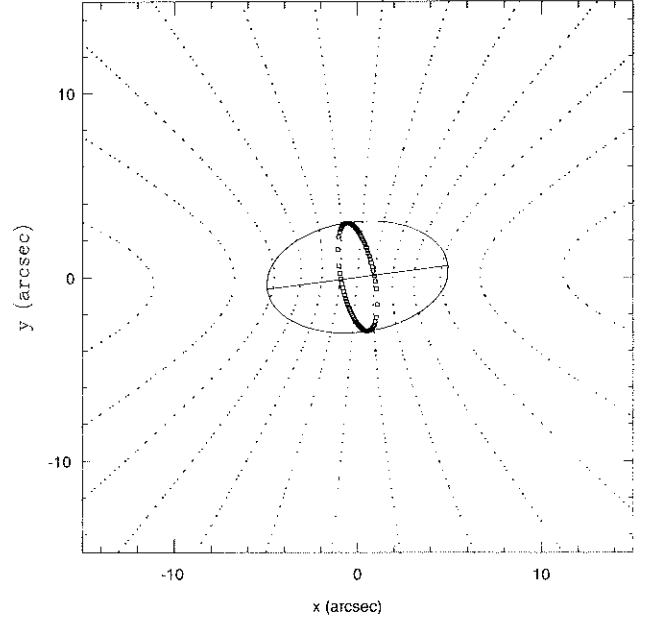
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi = 115.0$, $\theta = 44.0$
 Apparent axial ratio = 0.60, $p_a = 103.9$, kinematic misalignment = 45.0



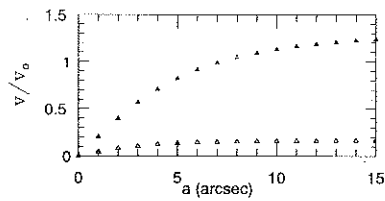
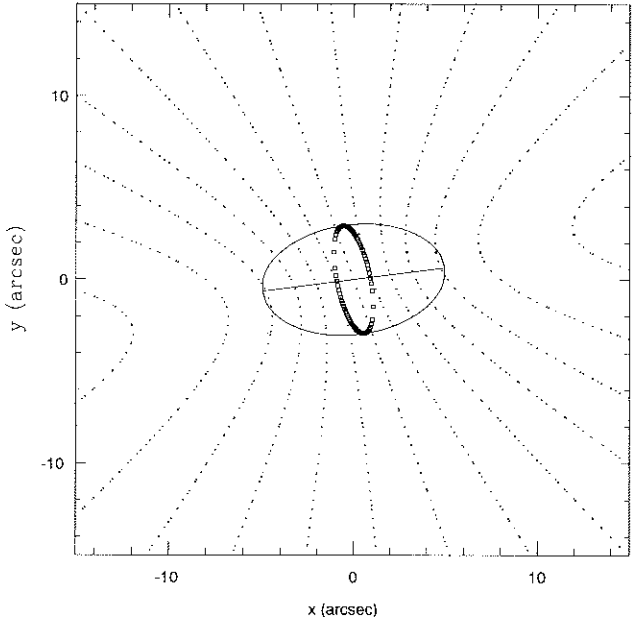
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi=115.0$, $\theta=44.0$
 Apparent axial ratio = 0.60, $pa=103.9$, kinematic misalignment = 90.0



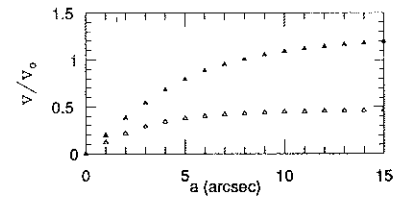
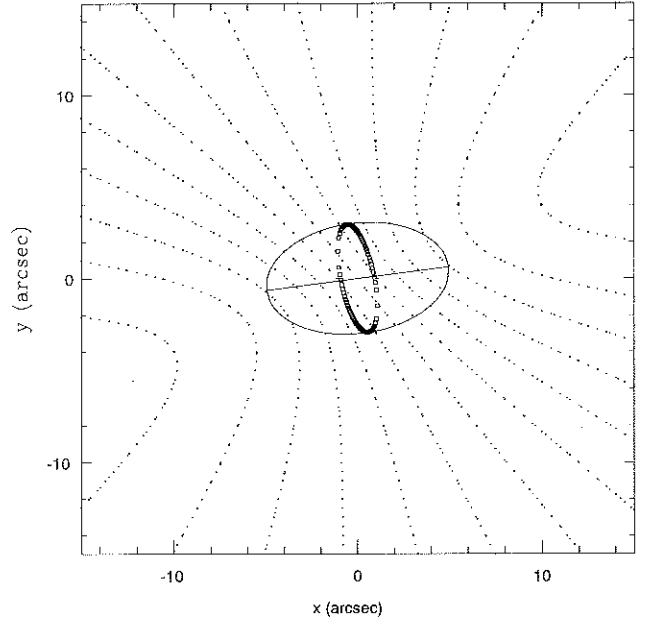
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=69.0$, $\theta=58.0$
 Apparent axial ratio = 0.60, $pa=82.6$, kinematic misalignment = 0.0



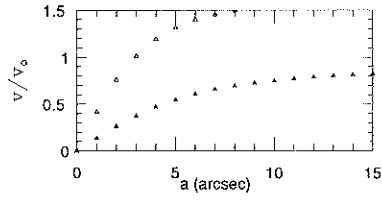
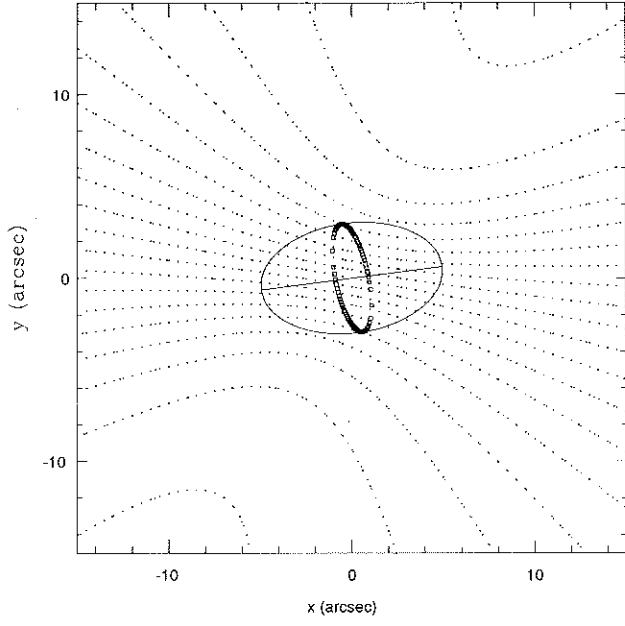
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=69.0$, $\theta=58.0$
 Apparent axial ratio = 0.60, $pa=82.6$, kinematic misalignment = 8.0



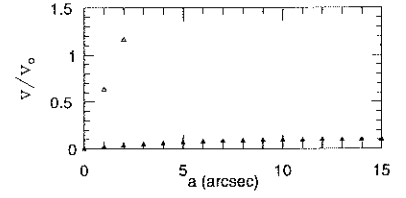
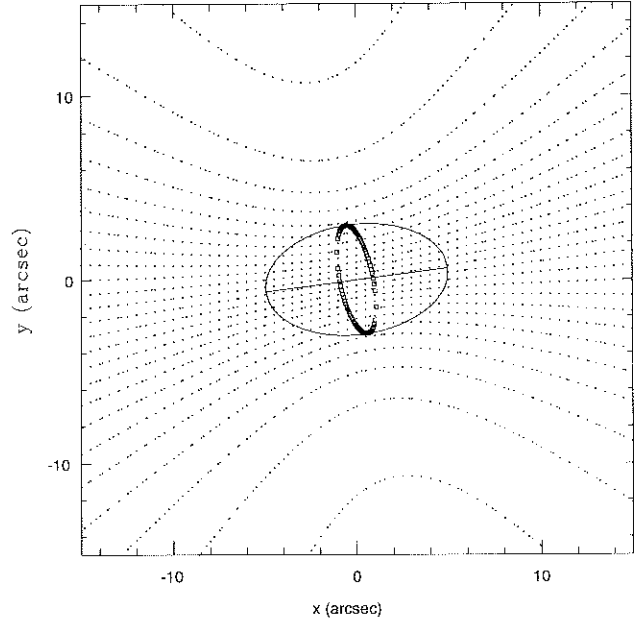
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=69.0$, $\theta=58.0$
 Apparent axial ratio = 0.60, $pa=82.6$, kinematic misalignment = 15.0



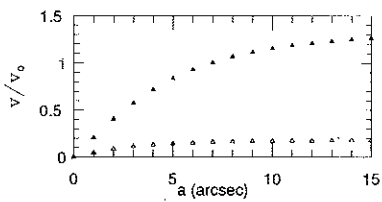
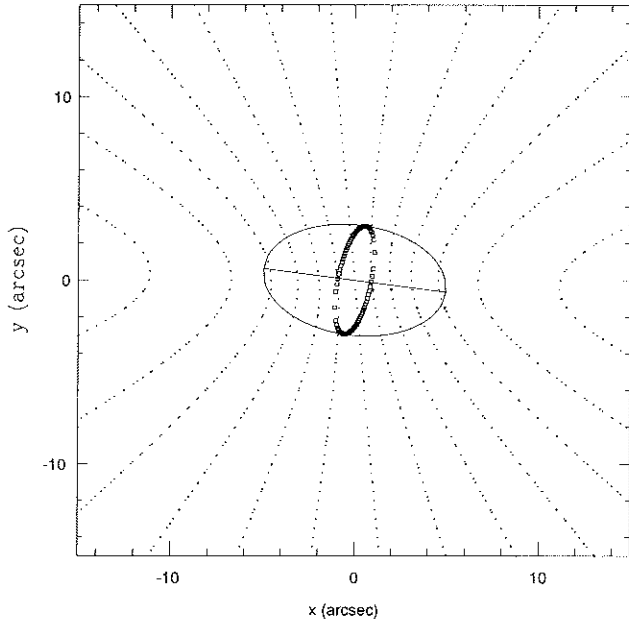
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 69.0$, $\theta = 58.0$
 Apparent axial ratio = 0.60, $pa = 82.6$, kinematic misalignment = 45.0



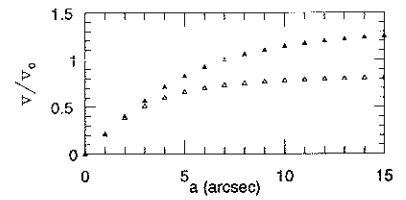
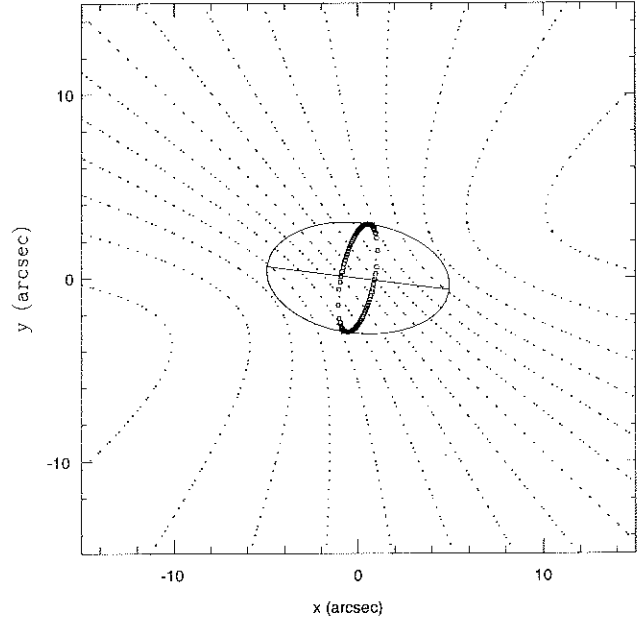
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 69.0$, $\theta = 58.0$
 Apparent axial ratio = 0.60, $pa = 82.6$, kinematic misalignment = 90.0



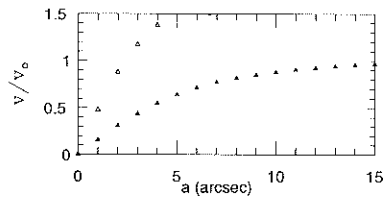
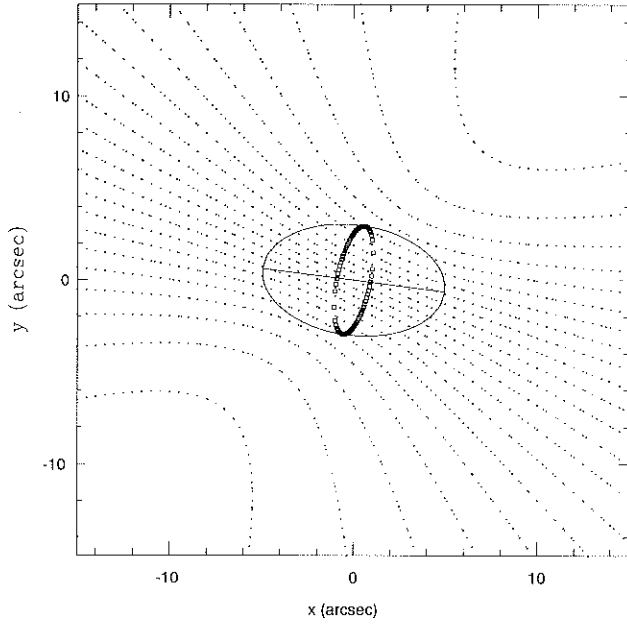
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 111.0$, $\theta = 58.0$
 Apparent axial ratio = 0.60, $pa = 97.4$, kinematic misalignment = 0.0



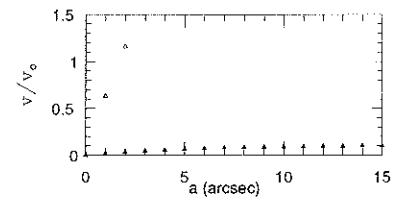
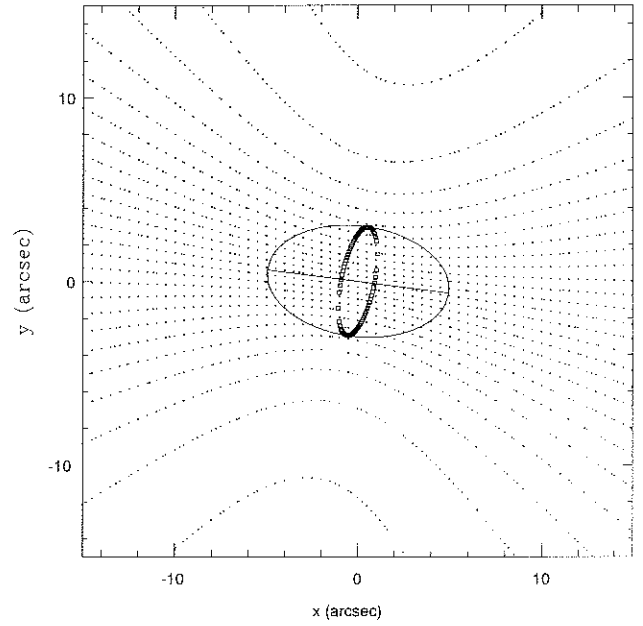
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi = 111.0$, $\theta = 58.0$
 Apparent axial ratio = 0.60, $pa = 97.4$, kinematic misalignment = 15.0



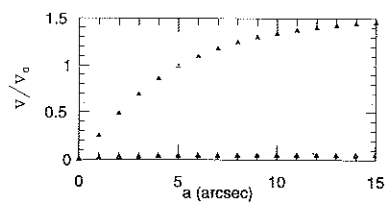
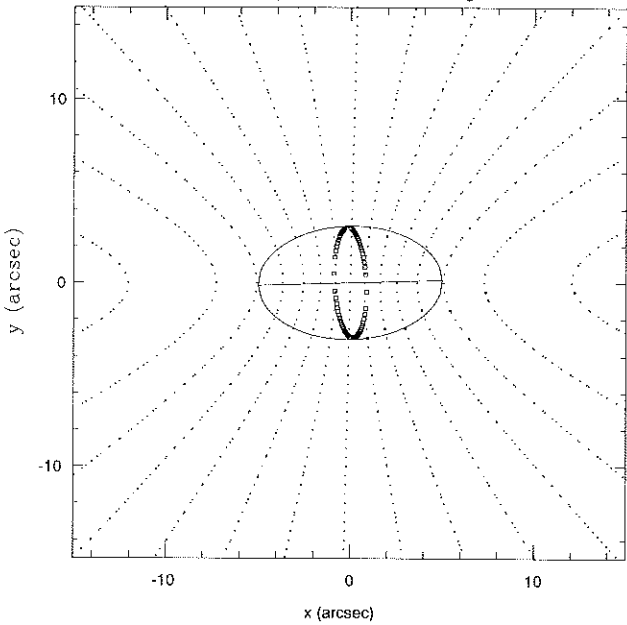
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=111.0$, $\theta=58.0$
Apparent axial ratio = 0.60, $pa=97.4$, kinematic misalignment =45.0



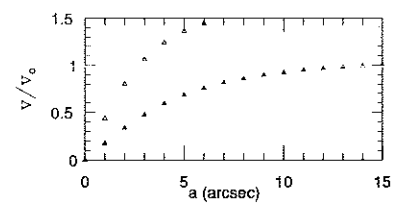
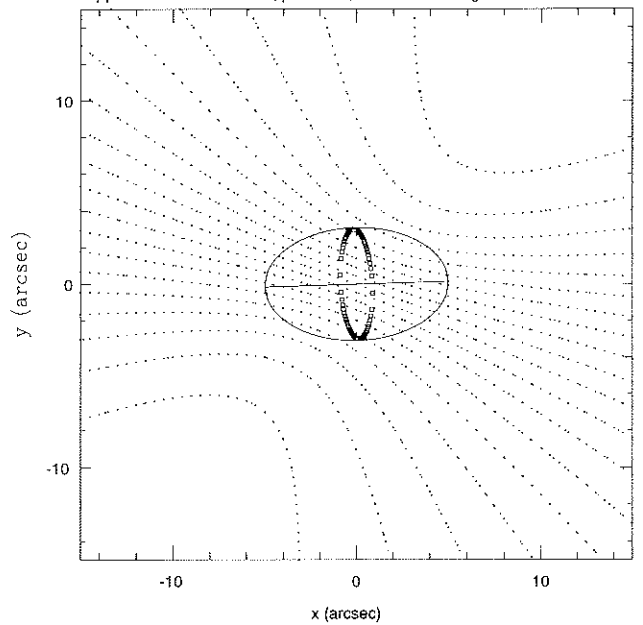
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=111.0$, $\theta=58.0$
Apparent axial ratio = 0.60, $pa=97.4$, kinematic misalignment =90.0

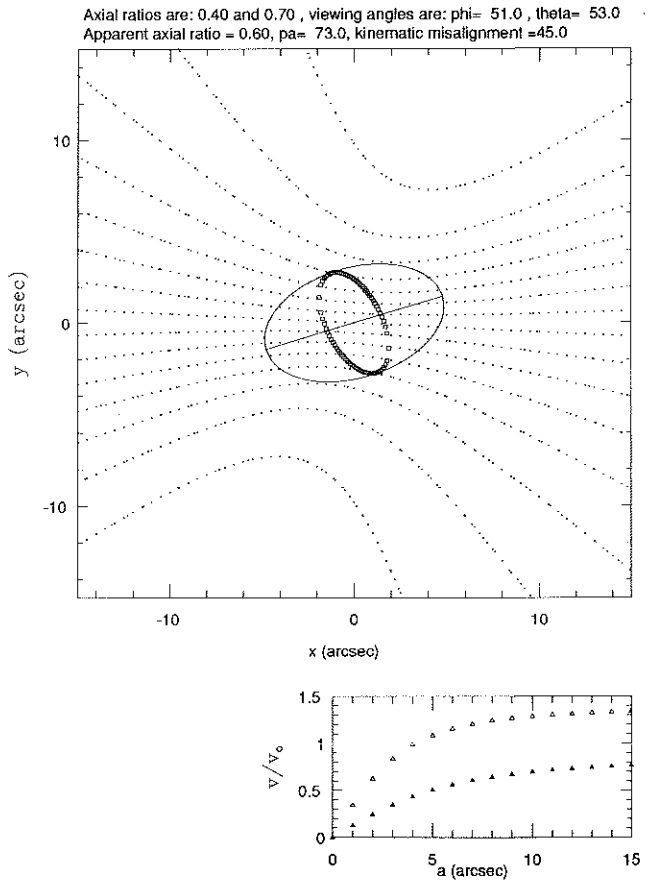
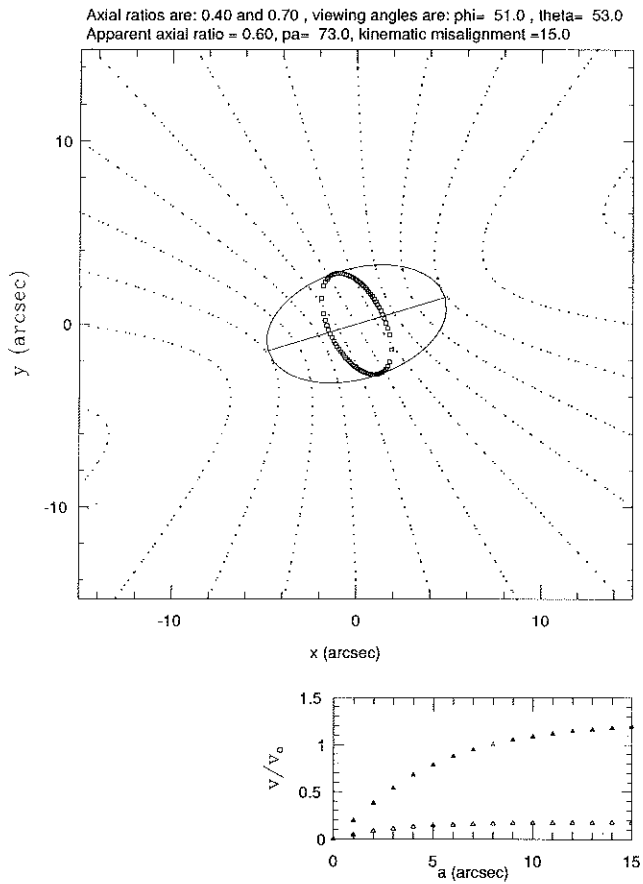
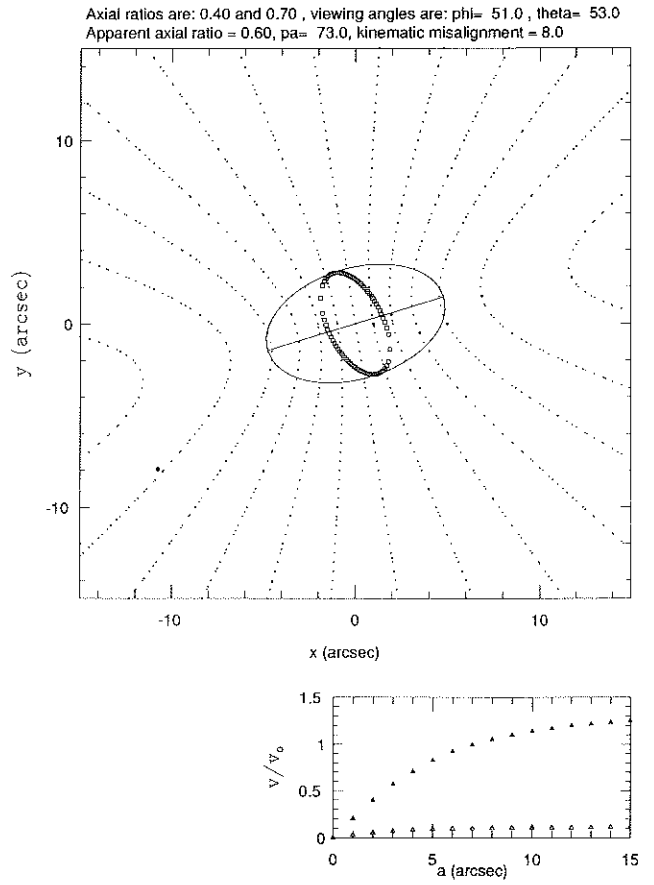
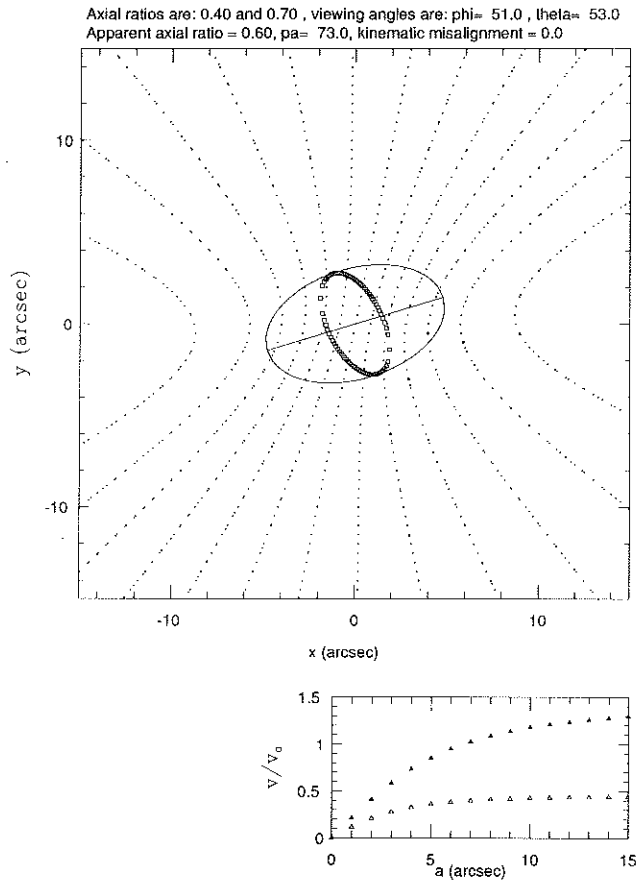


Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=73.0$, $\theta=80.0$
Apparent axial ratio = 0.62, $pa=88.3$, kinematic misalignment = 0.0

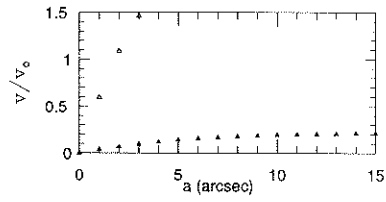
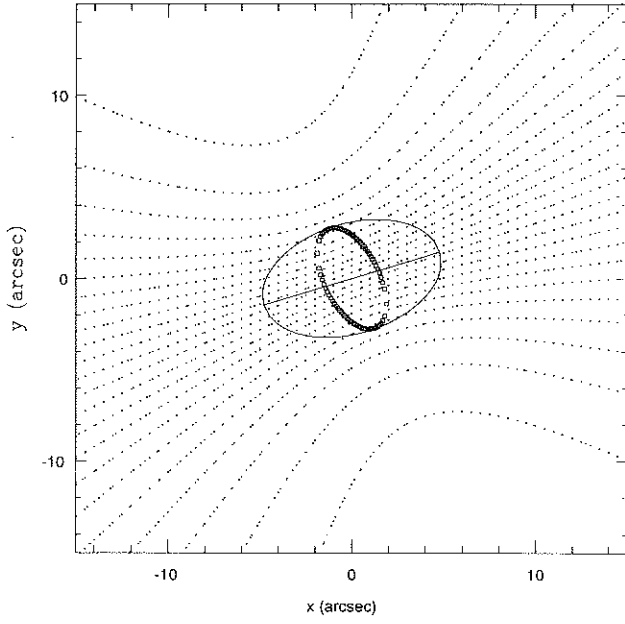


Axial ratios are: 0.60 and 0.80 , viewing angles are: $\phi=73.0$, $\theta=80.0$
Apparent axial ratio = 0.62, $pa=88.3$, kinematic misalignment =45.0

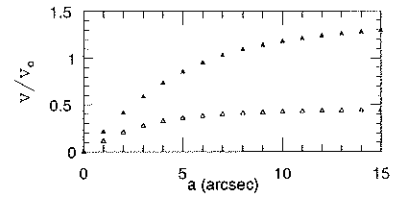
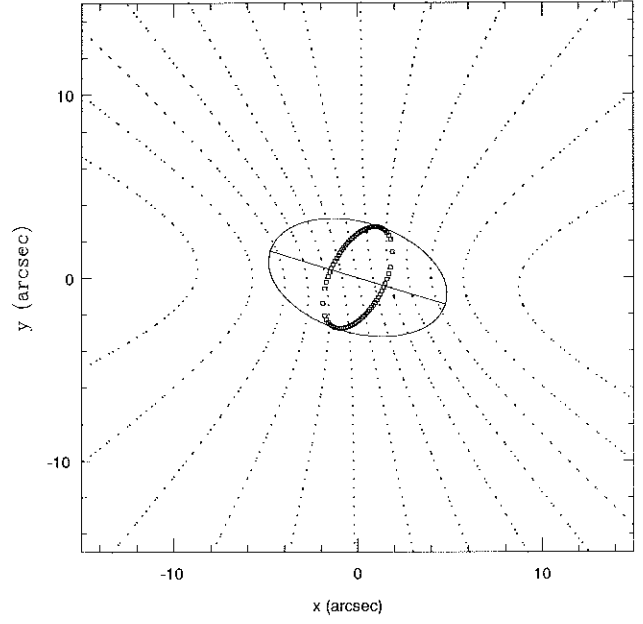




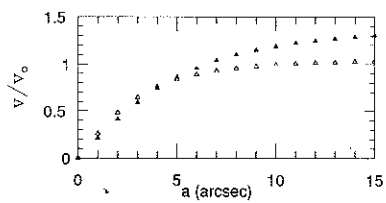
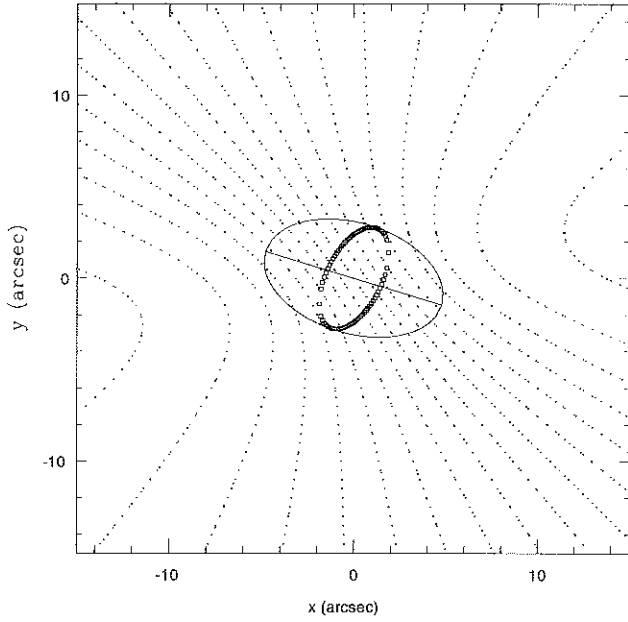
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 51.0$, $\theta= 53.0$
Apparent axial ratio = 0.60, $pa= 73.0$, kinematic misalignment =90.0



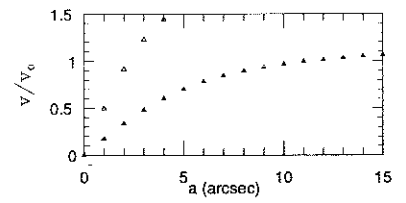
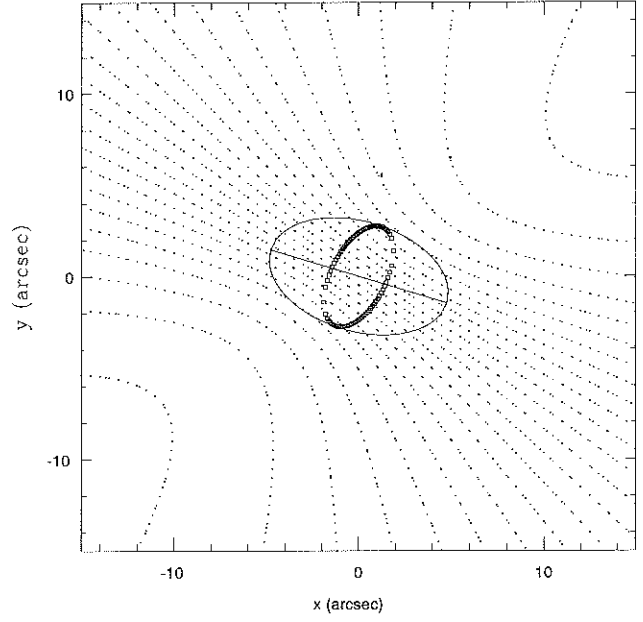
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 129.0$, $\theta= 53.0$
Apparent axial ratio = 0.60, $pa= 107.0$, kinematic misalignment = 0.0



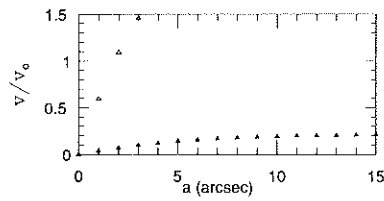
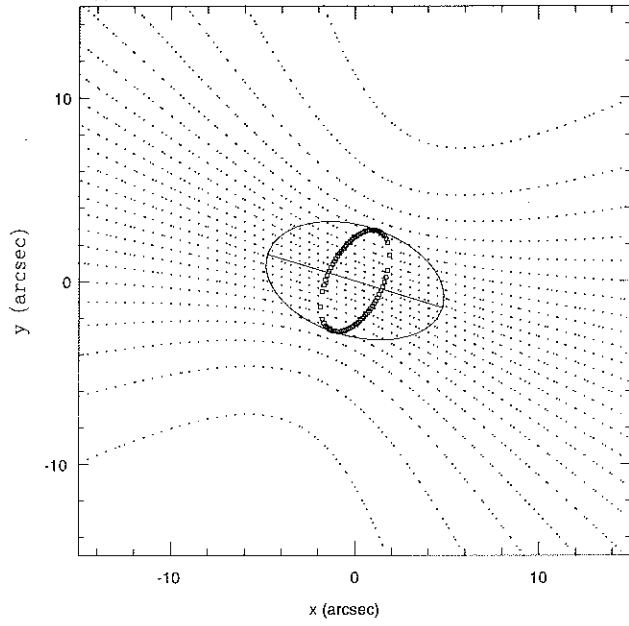
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 129.0$, $\theta= 53.0$
Apparent axial ratio = 0.60, $pa= 107.0$, kinematic misalignment =15.0



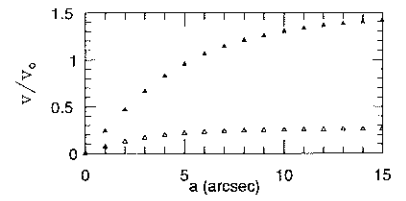
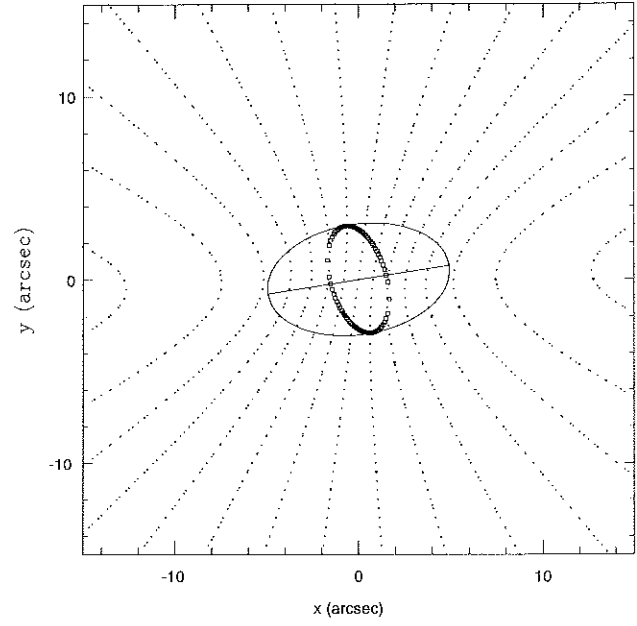
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi= 129.0$, $\theta= 53.0$
Apparent axial ratio = 0.60, $pa= 107.0$, kinematic misalignment =45.0



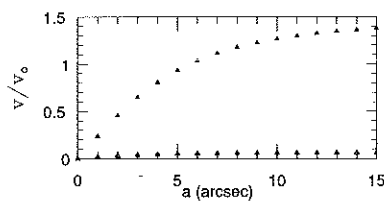
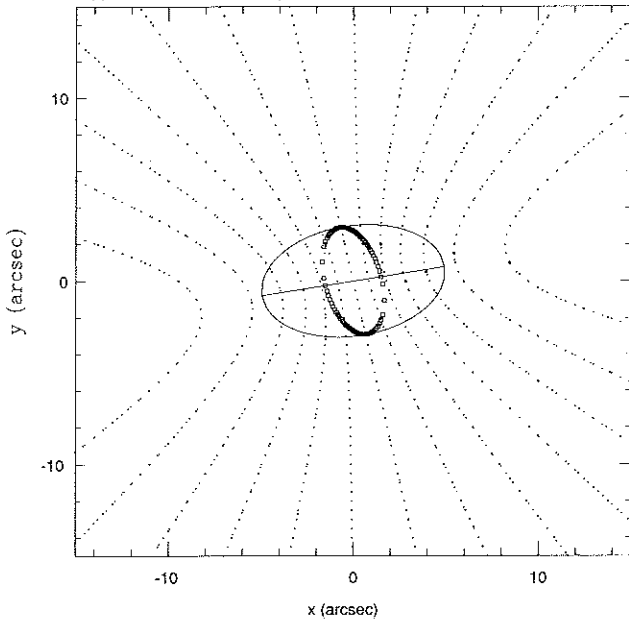
Axial ratios are: 0.40 and 0.70 , viewing angles are: $\phi=129.0$, $\theta=53.0$
 Apparent axial ratio = 0.60, $pa=107.0$, kinematic misalignment = 90.0



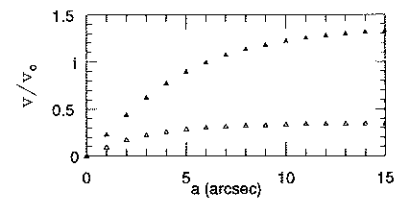
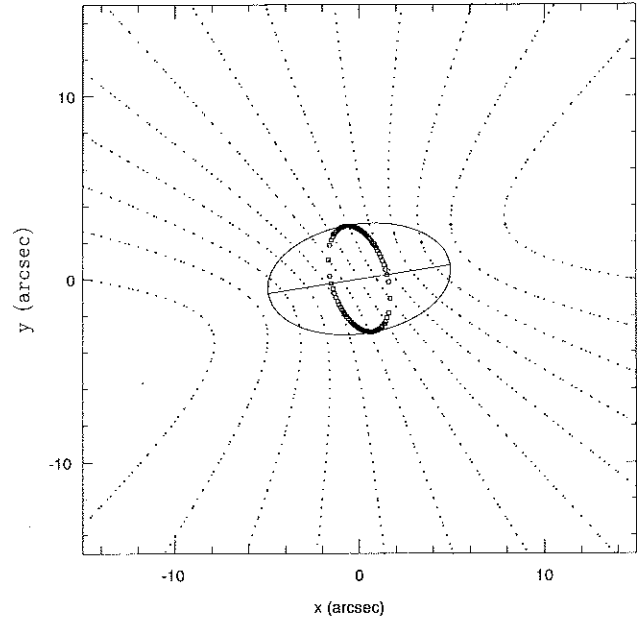
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=56.0$, $\theta=65.0$
 Apparent axial ratio = 0.60, $pa=81.1$, kinematic misalignment = 0.0



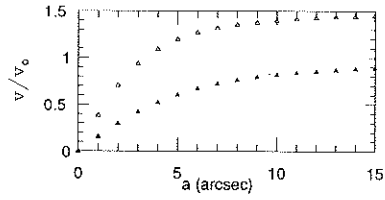
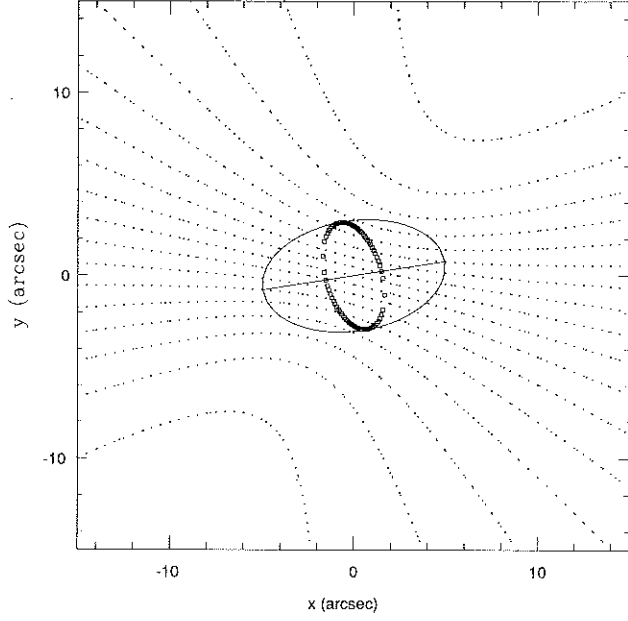
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=56.0$, $\theta=65.0$
 Apparent axial ratio = 0.60, $pa=81.1$, kinematic misalignment = 8.0



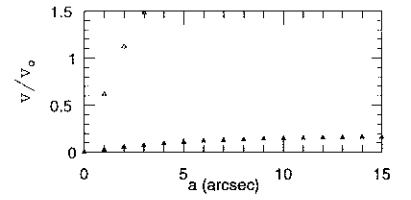
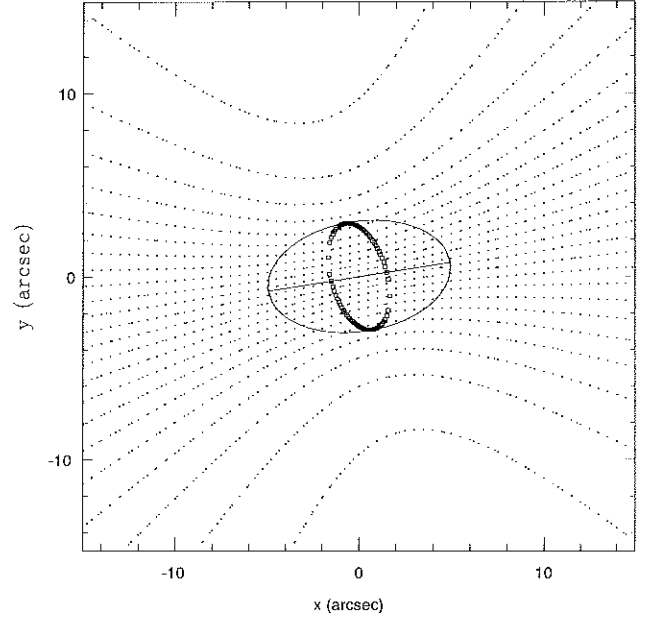
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi=56.0$, $\theta=65.0$
 Apparent axial ratio = 0.60, $pa=81.1$, kinematic misalignment = 15.0



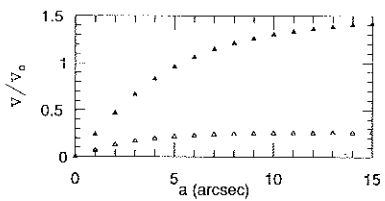
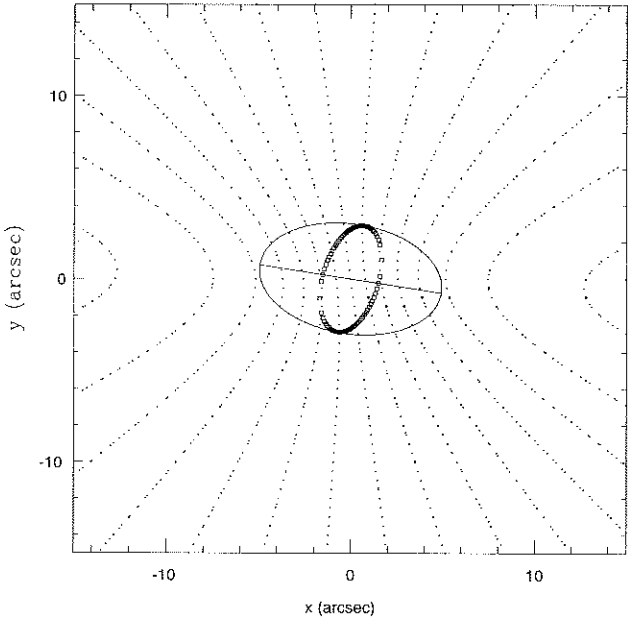
Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi= 56.0$, $\theta= 65.0$
Apparent axial ratio = 0.60, $pa= 81.1$, kinematic misalignment =45.0



Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi= 56.0$, $\theta= 65.0$
Apparent axial ratio = 0.60, $pa= 81.1$, kinematic misalignment =90.0



Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi= 124.0$, $\theta= 65.0$
Apparent axial ratio = 0.60, $pa= 98.9$, kinematic misalignment = 0.0



Axial ratios are: 0.50 and 0.75 , viewing angles are: $\phi= 124.0$, $\theta= 65.0$
Apparent axial ratio = 0.60, $pa= 98.9$, kinematic misalignment =15.0

