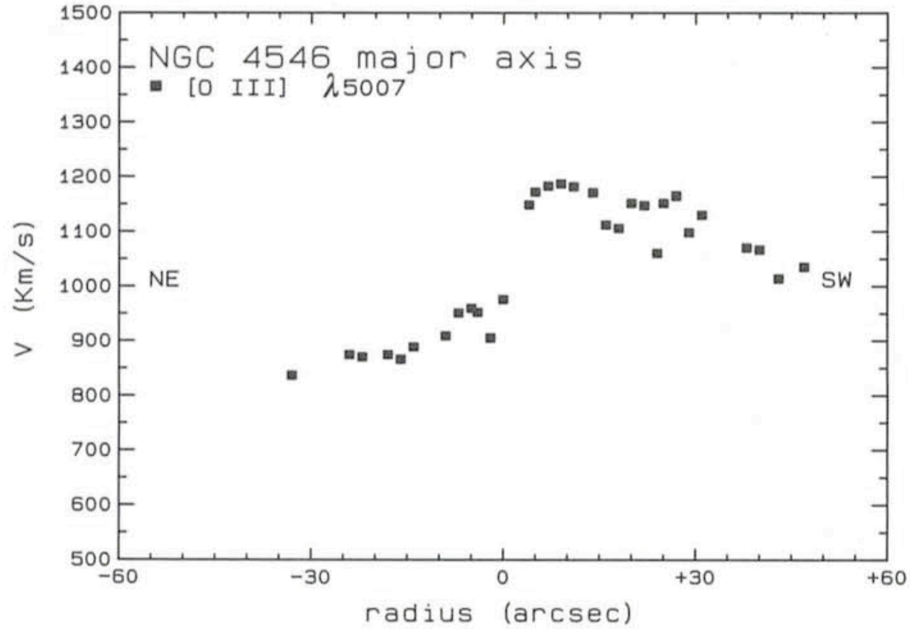


Figure 4: *Rotation curve for the gas along the major axis, from a Gaussian interpolation of the spectral line [OIII] λ 5007.*

## Applications for Observing Time at La Silla

**Period 39 (April 1–October 1, 1987)**

Please do not forget that your proposals should reach the Section Visiting Astronomers **before October 15, 1986.**

maximum of 12.5 km $s^{-1}$ $arcsec^{-1}$ gradient, with the exception of the rotation curve measured at P.A. = 213°, whose inner slope of about 5 km $s^{-1}$ $arcsec^{-1}$ is well down the expected value off 15 km $s^{-1}$ $arcsec^{-1}$.

Then, if all these motions are evolving along a plane, the plane of the gas is not coplanar with that of the stars and the gas existing within the galaxy shows a radial flow along the bar which could explain the asymmetries observed. In addition, since the maximum extension of the gas is observed near the major axis, about 30° from its direction of maximum velocity gradient, the gas itself appears confined within a more or less asymmetric disk, of projected dimension 1.7 × 8.2 kpc, not aligned with the stellar disk of the galaxy neither with the bar.

Where did this gas come from? One possible hypothesis is that the gas is circulating in one of the retrograde families of orbits possible in triaxial systems (de Zeeuw and Merrit 1983) or the bars (Freeman 1966, Contopoulos and Papayannopoulos 1980). It is expected in this case that, since the gas clouds are moving together with the stars in a narrow tube, this prevents their collapse by collision or dynamical friction. But this phenomenon involves confined regions of space, contrary to that observed. The same problem is present for a second possibility: that we are observing gas confined in a retrograde portion of a "hot" velocity field, similar to that found for some globular clusters in our galactic halo (Oort 1965). With the exception of the two above-mentioned cases, we find it difficult to imagine a mechanism that discriminates between gas and stars with common origin, driving it in two opposite directions of rotation. A third and alternative hypothesis is that the gas has not the same origin as the stars but is the result of a more or less recent acquisition, and comes from a retrograde collision with a dust cloud or a gas-rich dwarf galaxy. The discovery of hot stars or HI bridges with other close stellar systems would give an interesting check of this hypothesis.

Concluding this short note, we would like to draw the attention to another case of counter-rotation known in the literature, although the nature of this system is quite different from the disk galaxy considered here: along the major axis of the galaxy NGC 7097, classified E4, Caldwell et al. (1986) have measured a gas rotation of 200 km/s superimposed on a slow stellar rotation of a few tens of km/s in opposite direction.

### *References*


Bieging, J.H., 1978, *Astron. and Astrophys.* **64,** 26.

Caldwell, N., Kirshner, R.P., Richstone, D., 1986, *Astrophys. J.,* **305,** 136.

Contopoulos, G. and Papayannopoulos, Th., 1980, Astron. and Astrophys., **92,** 33.

de Vaucouleurs, G., 1975, in *Stars and Stellar Systems,* The University of Chicago Press, Vol. **IX,** p. 584.

de Vaucouleurs, G., de Vaucouleurs, A. and Corwin, H.G.Jr. 1976, RC2, *Second Reference Cat. of bright galaxies,* Austin, Univers. of Texas Press.

de Zeeuw, T. and Merrit, D., 1983, *Astrophys. J.,* **267,** 571.

Freeman, K.C., 1966, *Mon. Not. of Royal Astr. Soc.,* **134,** 1.

Humason, M.L., Mayall, N.V. and Sandage, A.R., 1956, *Astron. J.* **61,** 101.

Kormendy, J., 1979, *Astrophys. J.,* **227,** 714.

Kormendy, J., 1983, *Astrophys. J.,* **275,** 529.

Oort, J.H., 1965, in *Stars and Stellar Systems,* The University of Chicago Press, Vol. **V,** p. 486.

Schweizer, F., 1983, IAU Symp. no. **100,** p. 319.


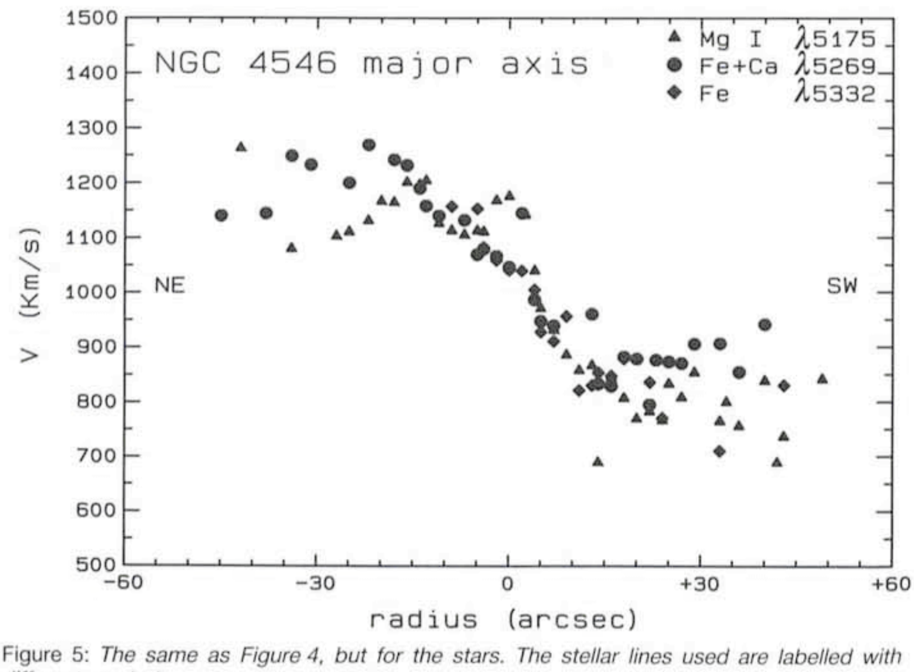


Figure 5: *The same as Figure 4, but for the stars. The stellar lines used are labelled with different symbols.*