STELLAR DYNAMICS OF RADIO ELLIPTICAL GALAXIES

A. Sansom
University of Sussex, Falmer, Brighton, U.K.
J.V. Wall, W.B. Sparks
Royal Greenwich Observatory, E. Sussex, U.K.

ABSTRACT. Stellar kinematical and dynamical results are presented for 34 radio ellipticals. The radio galaxies we observed were brighter than m(B)=16. The results show that these radio ellipticals are not generally more rapidly rotating than their non-radio counterparts. Evidence for some rotation about the major axis is seen in two cases. These radio ellipticals do not appear to obey the luminosity, velocity dispersion trend seen for normal ellipticals.

Long slit spectra of 34 radio ellipticals were obtained on the AAT. Stellar rotation curves and velocity dispersions were derived from these spectra using cross-correlation techniques. Two of the resulting rotation curves and velocity dispersion profiles, showing major and minor axis rotation are in Fig.1.

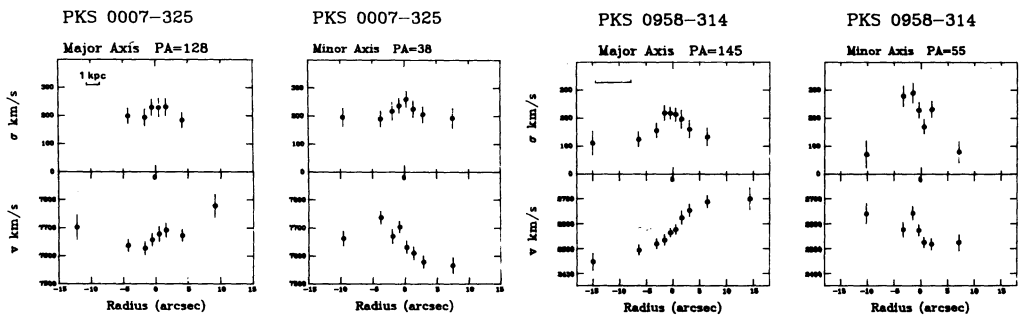

Fig.1. Stellar kinematic of two radio galaxies.

The ratio of measured rotation about the apparent minor axis to the central stellar velocity dispersion was plotted against ellipticity. Comparison with normal ellipticals from Davies et.al.(1983) shows that the radio galaxies, like normal ellipticals, are predominantly slowly rotating, in agreement with Heckman et.al. 1985.

T. de Zeeuw (ed.), Structure and Dynamics of Elliptical Galaxies, 429–430.

ABSOLUTE LUMINOSITY, VELOCITY DISPERSION RELATION

Observations, and accurate velocity dispersion measurement methods have been made for both radio and non-radio ellipticals, the most recent results of these are shown in Fig.2, together with the current data for the 34 radio galaxies (circles). Dressler's observations of Coma and Virgo ellipticals show a fairly tight correlation, for which $L \sim \sigma^{3.5}$ (for $\log\sigma > 2$).

The radio galaxies do not follow the $L \sim \sigma^{3.5}$ law. They lie systematically below the line and are different from this power law at the 99.9 percent confidence level. The spread of $\log\sigma$ at a given luminosity is larger for the radio galaxies (Shaver et.al. and Heckman et.al. samples) than it is for the galaxies in the Virgo and Coma clusters. Tests using PKS 0958-314 showed that the effect of the galaxies being at different distances and having decreasing velocity dispersion with radius is insufficient to produce the observed deviations in σ of the radio galaxies from the line in Fig.2.

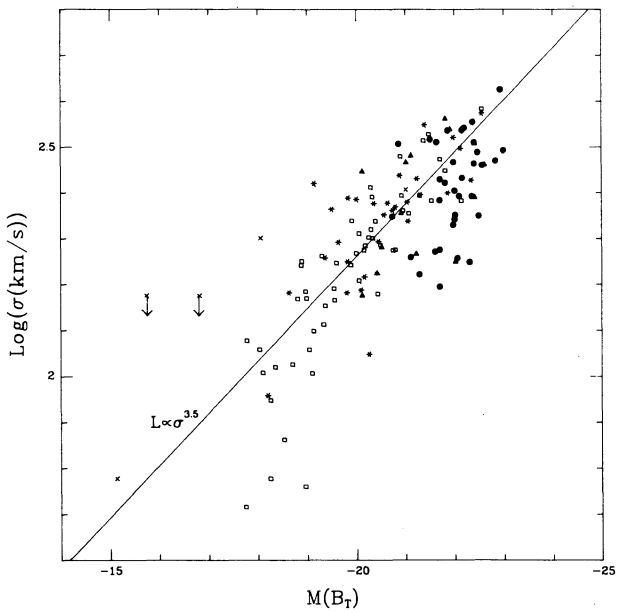

Fig.2.
Absolute B magnitude against velocity dispersion.

REFERENCES

Davies, R.L., Efstathiou, G., Fall, S.M., Illingworth, G.D., & Schechter, P.L., 1983. Ap. J., 266, 41.

Dressler, A., 1984. Ap. J., 281, 512.

Faber, S.M., & Jackson, R.E., 1976. Ap. J., 204, 668.

Heckman, T.M., Illingworth, G.D., Miley, G.K., & van Breugel, W.J.M., 1985. Ap. J., 299, 41.

Shaver, P.A., Danziger, I.J., Ekers, R.D., Fosbury, R.A.E., Goss, W.M., Malin, D., Moorwood, A.F.M., Wall, J.V., 1982. In IAU Symp. No. 97, "Extragalactic Radiosources", eds D.S. Heeschen & C.M. Wade (Reidel, Dordrecht), p. 55.