EXTENDED GASEOUS EMISSION IN NORMAL ELLIPTICAL GALAXIES

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It has been known for several decades that about 15% of elliptical galaxies contain ionized gas yet very little data is available in the literature on the properties of this gas such as spatial distribution, velocity field, and abundances. The properties of this gas are related to current problems about elliptical galaxies: (1) origin of the gas (stellar mass loss vs. accretion from a nearby gas-rich galaxy or an intergalactic cloud); (2) structure of the galaxy itself, because the locus of the stationary orbits of the gas depends on whether the galaxy is prolate or oblate and on whether the galaxy is rotating or not; (3) the relationship between the presence of gas in elliptical galaxies and their radio properties.

I give a brief report of a study done in collaboration with Alec Boksenberg (RGO) and Harvey Butcher (KPNO) of the gas in normal ellipticals. The spatial distribution of the gas has been observed using the Video Camera attached to the KPNO 4m telescope. Maps of the ionized gas in ten ellipticals have been obtained from frames taken through narrow-band filters centered at the redshifted Hα + NII lines and in the adjacent continuum. This is complemented by spectrography of the 6 galaxies with the brightest emission regions using the UCL IPCS attached to the Cassegrain Spectrograph of the ESO 3.6m telescope.

Extended emission is found in nearly all the galaxies observed. Typically the detected emission has a dimension of 2kpc. The isophotes are circular in the inner regions probably because the motion of the gas is dominated by turbulence near the centre. They become elongated further out, roughly approximating an ellipse or, in a few cases, they become irregular and very asymmetric. The spectra show that in contrast with the fairly irregular distribution of the gas, the velocity field is well ordered and is consistent with the gas being in a disk in rotation. There is, however, no clear relationship between the direction of the angular momentum of the gas and the major or minor axes of the stellar population. The emission line intensity ratios are compatible with the gas being excited by shocks but other processes such as photoionization by a weak central source, ultraviolet radiation from stars, kinetic energy of supernovae ejecta may also contribute to the excitation of the gas.

E. Athanassoula (ed.), Internal Kinematics and Dynamics of Galaxies, 309.