H II REGIONS IN DWARF IRREGULAR GALAXIES OF THE LOCAL GROUP

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Deep, narrowband Hα CCD surveys of H II regions have been carried out in several dwarf irregular galaxies in and near the local group. Data are now complete for these galaxies: NGC 6822, GR8, IC 10, IC 1613, Sextans A, Sextans B. and Sag Irr. Observations are complete for DDO 47, 53, 167, 168 and 187. Details of some of the results for the surveys completed so far are as follows:

NGC 6822. A CCD survey at Hα resulted in the detection of 145 H II regions in the local group irregular galaxy NGC 6822. Most of them are newly detected, faint surface-brightness objects. Positions, maps, and dimensions are being published elsewhere.

Calibrated Hα CCD images were used to obtain an absolute Hα luminosity function and several versions of diameter distributions. The luminosity function reaches from the most luminous H II region, which has an Hα flux of 4×10^{38} ergs/sec to the faintest limit yet obtained for an extragalactic H II region population, at a level of 5×10^{34} ergs/sec. We are exploring a portion of the H II region luminosity realm that has hitherto been largely unsampled, except in the solar neighborhood. Most of the H II regions are sufficiently faint to be explained by the excitation of a single early-type star, though some of the faintest are probably segments of diffuse galactic emission.

Although the bright end of the luminosity function can be fit satisfactorily to a power law, as found for most spiral galaxies, the curve has a peak at a flux of approximately 10^{36} ergs/sec, with a shallow decrease in number for fainter H II regions. This behavior results from the fact that the amount of ultraviolet energy released decreases more steeply than the number of stars increases for later type stars.

Three different definitions of sizes have been used to explore the properties of the H II region size distribution. As found for other galaxies, the size distribution can be fit by an exponential; the size scale is 33 pc. The fluxes are correlated to the 2.8 power of the diameter, but there is a large intrinsic scatter in this relationship.

GR8. Deep narrowband Hα imaging of the nearby dwarf irregular galaxy GR8 has revealed a total of 32 H II regions. Positions, Hα luminosities, and sizes of these objects have been determined. The Hα luminosity function has the same shape as that for more luminous galaxies, except for size of sample effects. Most H II regions detected are at the very low luminosity end of the general luminosity function. The size distribution has an exponential shape, as for other galaxies, with a size scale of 17 pc. Candidates for the exciting stars can be identified for some of the H II regions; they are very blue, with $M_B = -5$ to -6.

IC 10. Deep CCD narrowband Hα imaging of the local group dwarf irregular galaxy IC 10 has revealed a total of 144 H II regions. Positions, Hα luminosities, and sizes of these objects have been determined. The Hα luminosity function has the same shape as that for more luminous galaxies. The faintest H II regions are at the low-luminosity end of the generally observed luminosity function for H II regions in galaxies, with fluxes of only $\sim 8 \times 10^{34}$ erg/sec. The size distribution has an exponential shape, as for other galaxies, with a size scale of 23 pc. Published radio continuum and CO maps compare well with the

Hα emission distribution in the brightest areas, when smoothed to comparable resolution. The distribution of H I is similar in the central areas to the H II, but is much more widely distributed in the outer areas.

IC 1613. A deep search of 25 CCD fields centered on IC 1613 has resulted in a catalog of 71 H II regions, which include the 19 mapped by Sandage (1971) and most of the 26 measured by Price (1989). Our objects include several very low surface brightness rings and circular objects at large distance from the main body of the galaxy.

Sandage, A. R. 1971, *Ap. J.*, **166**, 13.
Price, J. 1989, this conference

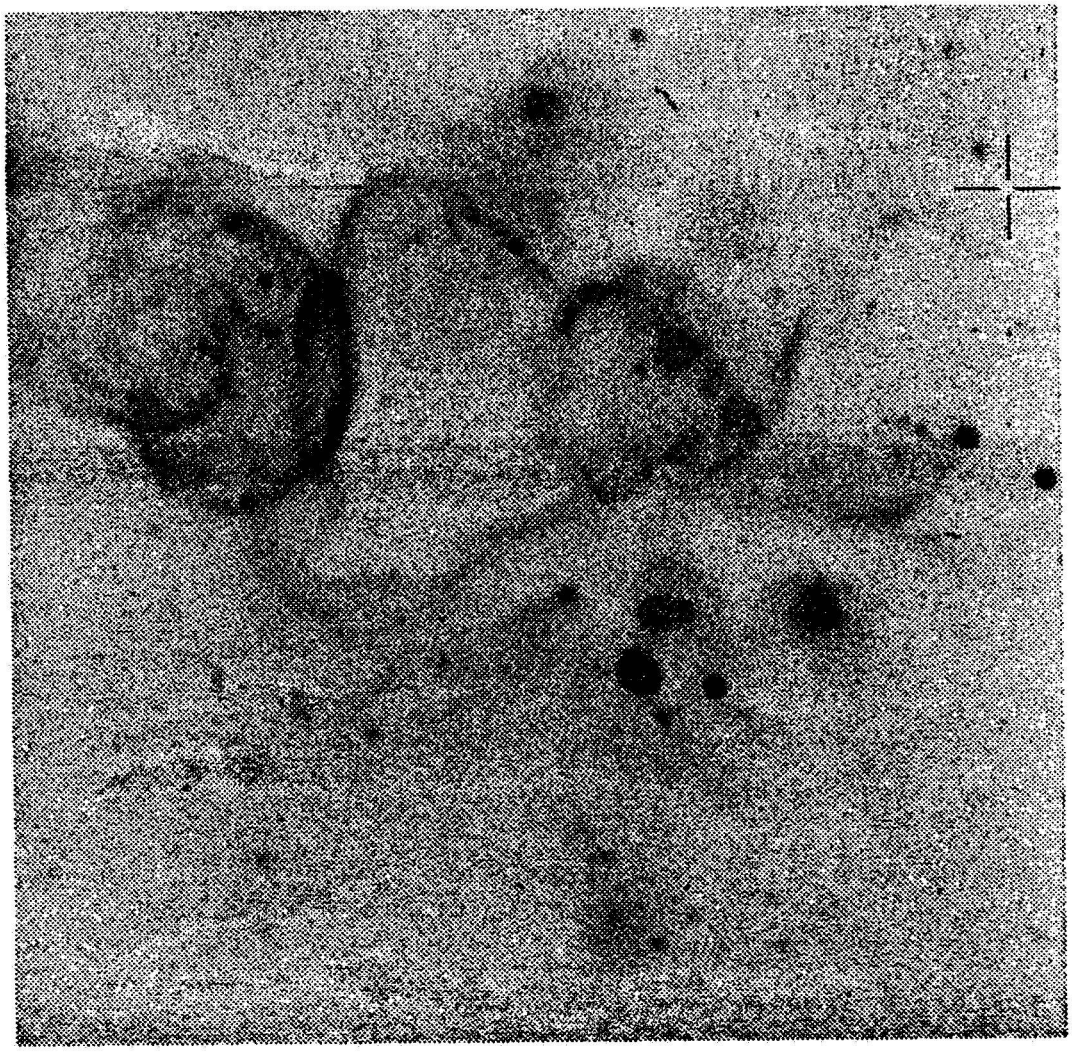

Figure 1. Sample CCD frame showing central H II regions of IC 1613.

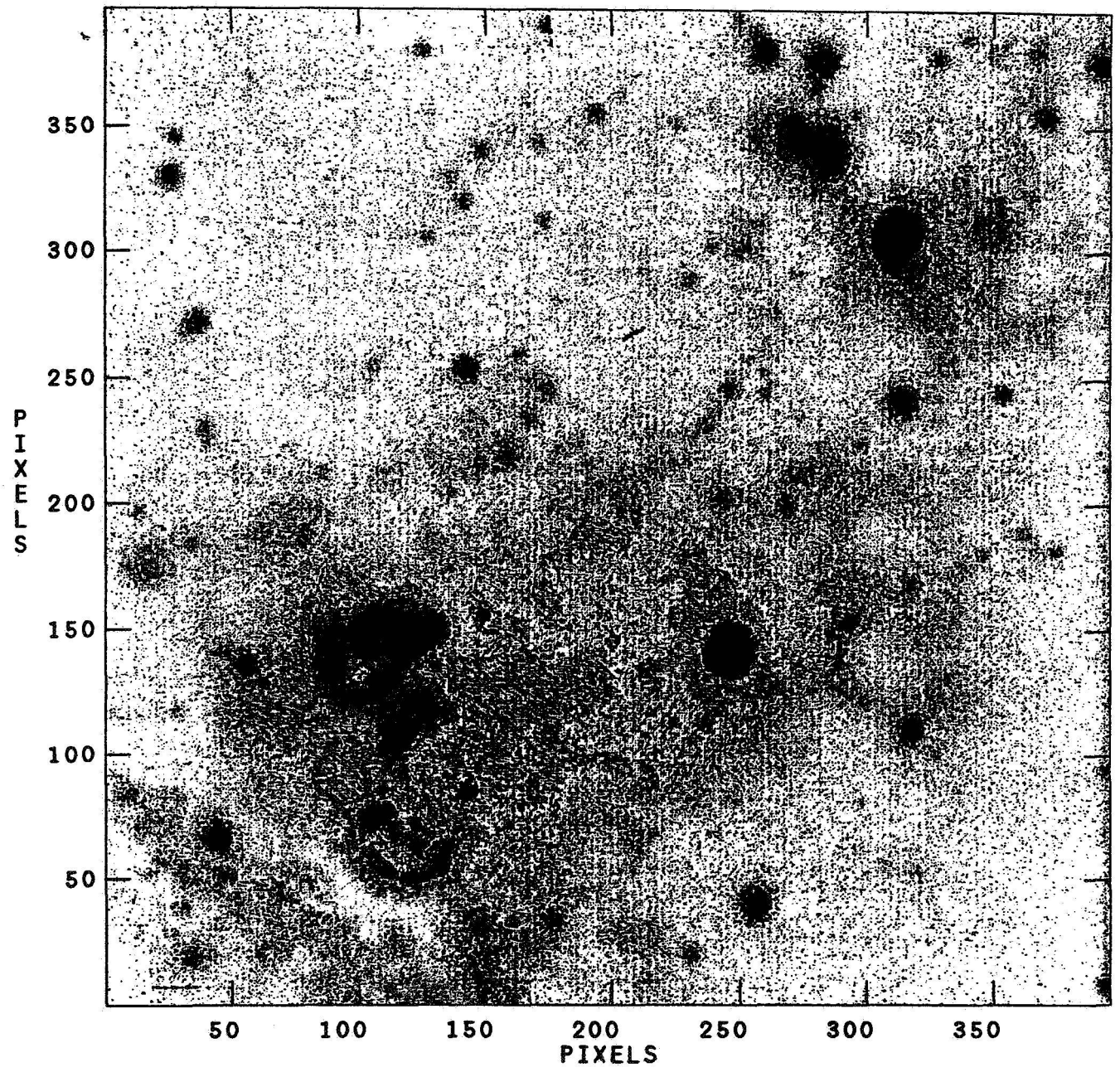

Figure 2. Sample CCD frame showing H II regions in IC 10.