Publications of the Astronomical Society of the Pacific
106: 424–424, 1994 April

DISSERTATION SUMMARY

Star Formation in Giant Extragalactic H II Regions

Y. DIVAKARA MAYYA

Thesis work conducted at: Indian Institute of Astrophysics, Bangalore-34, India and Physics Department, Indian Institute of Science, Bangalore-12, India
Current address: Infra Red Astronomy Group, Tata Institute of Fundamental Research, Homi Bhabha Road, Colaba, Bombay 400 005, India
Electronic mail: ydm@tifrvax.ernet.in
Ph.D. dissertation directed by: T. P. Prabhu and C. J. Jog
Ph.D. degree awarded: 1993

Received 1994 January 28

Star-formation properties in giant extragalactic H II regions (GEHRs) are investigated using optical photometry and evolutionary population synthesis models. Photometric data in *BVR* bands and in the emission line of Hα are obtained by CCD imaging at Vainu Bappu Observatory, Kavalur. Aperture photometry is performed for 180 GEHRs in galaxies NGC 1365, 1566, 2366, 2903, 2997, 3351, 4303, 4449, 4656, and 5253. Thirty-six of these GEHRs having published spectroscopic data are studied for star-formation properties. The population synthesis model is constructed based on Maeder's stellar evolutionary and Kurucz stellar atmosphere models, to synthesize observational quantities of embedded clusters in GEHRs. The observed Hα luminosity is a measure of the number of massive stars while the contribution to *BVR* bands is from intermediate-mass (5–15 $M_{\odot}$) stars when the cluster is young and from evolving supergiants when the cluster is old (age $\geqslant$6 Myr).

Differential reddening between gas and embedded stars is essential to constrain the dereddened cluster colors within the range of youngest clusters. Obscuring dust closely associated with gas, which is distributed in filaments and clumps, as in the case of 30 Doradus, is the most likely configuration giving rise to net reduction of extinction towards stars. The fraction of the stellar photons escaping the nebula unattenuated is estimated to be 50%.

GEHRs are rarely found to be simple systems containing stars from a single generation. In the present sample such regions in addition to being older than 3 Myr, have their Lyman continuum luminosity reduced by as much as 60%, compared to the observed *B* band luminosity for a normal IMF. The missing ionizing photons may be escaping the nebula, leading to the ionization of extra-H II region ionized medium.

Coexistence of young (age $\leqslant$5 Myr; stars producing ionizing photons) and old populations ($\sim$10 Myr; red supergiants) is found to be common in GEHRs. The emission and continuum knots are seen spatially separated (40–100 pc) on CCD images in galaxies NGC 2997, 4303, and 4449 and may be direct evidence for the coexistence of young and old populations in giant star-forming complexes. Triggering of star formation from earlier bursts is the most likely cause of new generation of stars, and may be a common phenomenon in GEHRs. Spatial separation between the young and old stars ($\sim$30 pc) had been earlier reported in 30 Dor. Thus GEHRs in nearby galaxies share many of the properties shown by 30 Dor, the nearest GEHR.