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Evolution of HII Regions around Massive YSOs

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Abstract. We survey HII free-free emission around ∼60 spectroscopically confirmed young stellar objects (YSOs) in the Large Magellanic Cloud using the Australia Telescope Compact Array (ATCA) at 3.3 and 5.5 cm. From each YSOs' infrared spectrum, we: a) quantify how embedded/evolved the YSO is through principle component analysis (PCA) of the silicate absorption (Seale *et al.* 2009); and b) estimate the mass from SED models (Robitaille *et al.* 2007). We have four main results: (1) Based on mass estimates from SED models and ATCA detection limits, we find that most massive YSOs are in HII regions regardless of age; (2) Older massive YSOs (as indicated by silicate PCA index) are much more likely to be resolved than younger YSOs, indicating evolving HII regions; (3) Resolved (typically older) sources usually have lower densities. Thus, in our survey we see a transition from ultra-compact HII to HII regions; and (4) We find that accretion about the massive YSO is likely non-spherical, resulting in HII regions in the shape of prolate spheroids.

Keywords. stars: formation — HII regions — radio continuum: stars — Magellanic Clouds

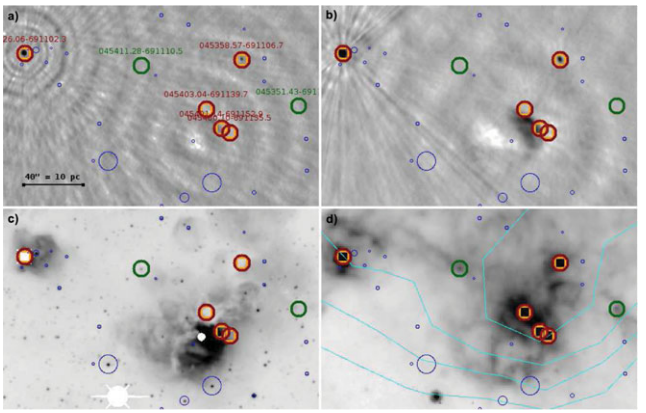

Figure 1. A field observed with ATCA. Red and yellow circles: high-mass YSOs; green circles: intermediate-mass YSOs; blue circles: ionizing stars, with radius proportional to mass. a) ATCA HII free-free emission at 3.3 cm with beam size of ∼2″ by 1.3″, b) ATCA HII free-free emission 5.5 cm observations with beam size of ∼3″ by 2″; clear detections are seen for two massive YSOs in the north, c) Blanco 4m MOSAIC2 Hα, and d) Spitzer IRAC 8μm.

References

Robitaille, T. P., Whitney, B. A., Indebetouw, R., & Wood, K. 2007, *ApJS*, 169, 328
Seale, J. P., Looney, L. W., Chu, Y.-H., *et al.* 2009, *ApJ*, 699, 150