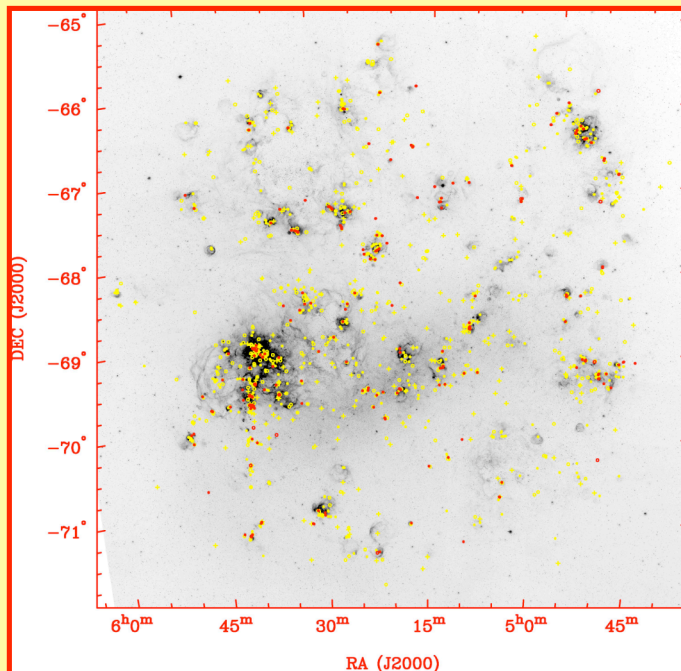


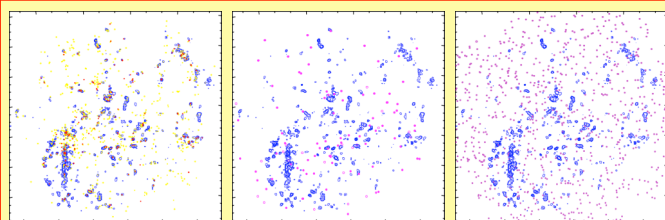
A Complete Inventory of High- and Intermediate-Mass YSOs in the LMC

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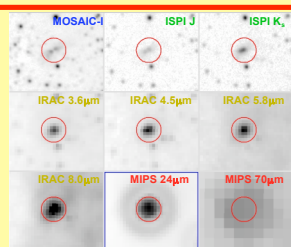
We have used archival Spitzer observations of the Large Magellanic Cloud (LMC) comprised mostly of observations by the SAGE Legacy program (Meixner et al. 2006) to search for high- and intermediate-mass YSOs in the LMC. We then use optical and near-IR observations to minimize the contamination of this sample to by evolved stars with IR excesses, such as Asymptotic Giant Branch (AGB) and post-AGB stars, and extended sources, such as background galaxies and nebular emission knots. The resulting sample of YSOs is unique in that they all have a common, well-established distance (50 kpc) and are close enough that both existing and follow-up observations can be used to better establish their nature, physical properties, and interstellar environment.



Distribution of YSOs and YSO candidates shown on MCELS H α (Smith et al. 1999). Sources shown in RED have $[8.0] > 8.0$ mag which, based on models (e.g. Whitney et al. 2003) should have masses greater than $\sim 8-10 M_{\odot}$, while yellow sources will generally have lower mass.



Relative distribution of YSOs (left), obscured AGB/post-AGB stars (center), and background galaxies (right) shown with respect to molecular clouds from Fukui et al. (2001). Field of view is the same as larger figure.



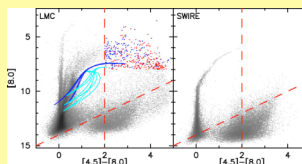
The first image of a protostellar disk in the LMC?

Taxonomy of Sources:

Type of Source	Total Number	Number with $[8.0] > 8$ mag
YSOs	858	234
Probable YSOs	303	14
Possible YSOs	167	
Diffuse Sources	126	13
Obscured AGB/post-AGB stars	110	105
Planetary Nebulae	52	9
Background Galaxies	947	6
Probable Background Galaxies	126	

Methodology:

- Aperture photometry was obtained for all IRAC and MIPS 24 μ m bands
- Color-Magnitude and Color-Color Diagrams were constructed

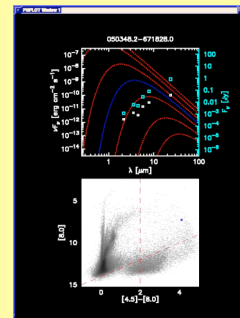
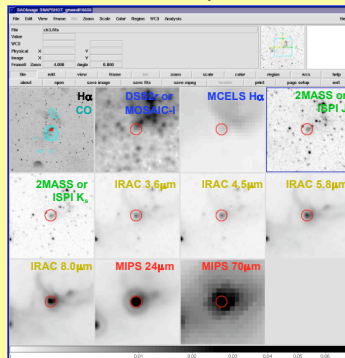


These CMDs show all sources in the LMC with a similar diagram for sources in the SWIRE Legacy program (Lonsdale et al. 2003) which shows where expected foreground Galactic and background extragalactic sources should be expected. The blue lines show the expected location of AGB based on models by Groenewegen et al. 2005).

- Contamination by non-YSOs was first minimized by a pair of criteria shown as dashed lines in the figure. The vertical cut at $[4.5]-[8.0] = 2.0$ minimizes the number of AGB and post-AGB stars. The diagonal cut excludes most background galaxies. 2914 sources remain to be considered.

- Multi-wavelength assessment of remaining candidates.

A program was developed using DS9 and WIP which enables us to consider each source in as many wavebands as possible (shown below). For each source, we consider its optical, near-IR and mid-IR counterparts, local environment, SED, and position in the CMD to better assess its nature.



Ask for a demonstration.

Source types using Color-Magnitude and Color-Color Diagrams:

The diagrams to the right demonstrate that there are no unique color-magnitude or color-color criteria that can separate YSOs from other types of sources. Careful examination of each source with as broad a wavelength coverage as possible is required to properly assess its nature. Follow-up IRS observations of bright YSO candidates are underway and a sample of fainter sources will be proposed for Spitzer Cycle 5.

