Maser and Control Data

Using the Megamaser Cosmology Project and the SDSS DR 7 we get our samples of:
- 80 masers
- 1608 non-detections (surveyed, but no detections)
- Spectroscopic data:
  - 56 masers
  - 1227 non-detections

Goals of our Analysis

In order to find correlations between host galaxies and megamaser activity, we investigate:
- Optical spectral classifications: Seyferts, LINERS, Transition, HII (different types of accretion onto the central supermassive black hole)
- Central black hole masses (from velocity dispersions)
- Luminosities of specific emission features
- Masses and ages of associated stellar populations
- Host galaxy morphologies and colors

Environmental Properties

We investigate the type of extragalactic environments of maser and control galaxies via near neighbor statistics to calculate the average number densities, as well as a comparison of the photometric properties of the neighbors. We consider number of neighbors and their colors within 0.5, 1, 5, and 10 Mpc of the maser and control galaxies. (1pc = 3.26 light-years)

Comparison of g-r colors of neighbors of maser and control galaxies in 4 different volumes:

1. Ellipticals
2. Spiral
3. Uncertain (includes irregulars)
4. Mergers

Host Galaxy Morphology

We used Galaxy Zoo classifications for:
- 40% of the maser galaxies
- 75% of the control galaxies

We did the rest!

Galaxy Zoo classified galaxies as "Uncertain" if there wasn't an 80% agreement on one specific classification

Galaxies were placed into one of four categories:
1. Elliptical
2. Spiral
3. Uncertain (includes irregulars)
4. Mergers

Preliminary Results:

- Investigate specifically the mega-masers in a disk configuration
- Expand the morphological distributions to the mega-maser category separately
- Continue to examine how morphology, color, absolute magnitude, and stellar masses affect the detection rate of mega-maser emission
- Look into the error associated with the detection rate calculations
- Determine how mega-maser emission may be linked to the evolution of the host galaxy

Galaxies with the following properties:
- M < -18
- Morphology = spiral
- 1.5 < u-r < 3.1
- 0.4 < g-r < 1.1

Have a ~ 3.6% maser detection rate, which is a slight improvement to current searches.

For the Future

- Investigate specifically the mega-masers in a disk configuration
- Expand the morphological distributions to the mega-maser category separately
- Continue to examine how morphology, color, absolute magnitude, and stellar masses affect the detection rate of mega-maser emission
- Look into the error associated with the detection rate calculations
- Determine how mega-maser emission may be linked to the evolution of the host galaxy

References

- Redpath, et al., (in prep)