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Tackling an ALMA-ACA volume-complete sample of AGB stars

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Mass-loss from asymptotic giant branch and red supergiant stars drive local galactic chemical evolution, but one of the main uncertainties in quantifying this process is the spatial and temporal variations in mass-loss across the evolved star population. A large sample of sources is needed to recover the statistical mass-loss rate, and variation thereof, as a function of observable stellar parameters.

We will describe a volume-limited sample of nearby evolved stars that the Nearby Evolved Stars Survey (NESS) team is building. The program started with initial data from a James Clerk Maxwell telescope (JCMT) large program, where CO 3-2 and 2-1 observations were obtained for all known AGB stars in the Solar Neighborhood, within a radius of 2 kpc.

We will focus on the current efforts being done using the group's interferometric observations from the Atacama Large Millimeter/submillimeter Array (ALMA). The data is bringing the ability of the JCMT at the largest angular scales with those of the angular resolution of ALMA's Atacama Compact Array (ACA) to probe their circumstellar envelopes. We are interested in the mass-loss histories, geometries, and 12C/13C and dust-to-gas ratios in order to make predictive estimates for stellar evolution models and quantify the dust and molecular inventory AGB stars return to the interstellar medium. In this talk we will present preliminary results based on roughly half of the ACA observations available, including detection rates of the CO lines, angular extensions of the envelopes, and general statistical properties of the sample's data. We will also present physical parameters, including mass loss rates, that can be obtained from the observations.

Primary authors: Dr TREJO-CRUZ, Alfonso (IRyA-UNAM); SRINIVASAN, Sundar (Instituto de Radioastronomia y Astrofisica, Universidad Nacional Autonoma de Mexico (IRyA-UNAM)); SCICLUNA, Peter (Space Science Institute)

Presenter: Dr TREJO-CRUZ, Alfonso (IRyA-UNAM)

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