AGB stars and their environment

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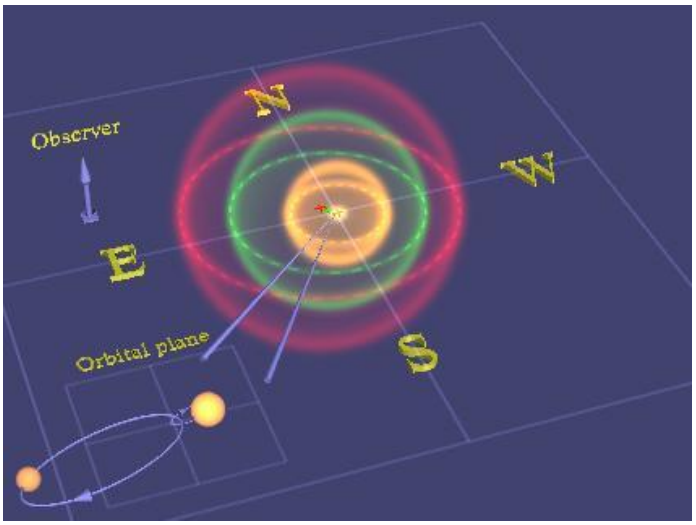
During their late pulsating phase, AGB stars expel most of their mass in the form of dusty envelopes, an event that largely drives the chemical composition of interstellar matter. The envelopes, however, are distant and opaque to visible and NIR radiation: their structure remains poorly known and the mass-loss process poorly understood. Millimeterwave interferometry, which combines the advantages of longer wavelength, high angular resolution and very high spectral resolution, is the optimal investigative tool for this purpose. Mm waves pass through dust with almost no attenuation. Their spectrum is rich in molecular lines and hosts the fundamental lines of the ubiquitous CO molecule, allowing a tomographic reconstruction of the envelope structure.

After a short description of the TP-AGB stage, we will focus on a few envelopes, recently studied by millimeter-wave interferometry, which teach us about the nucleosynthetic and mass-loss processes during this fairly short, albeit capital phase of stellar evolution. Emphasis will be placed on CW Leo /IRC+10216, the archetype of TP-AGB stars, whose simple, nearly spherical geometry allows a 3-D reconstruction of the envelope and of the recent mass-loss history.



Schematic view of the 3 brightest shells of the CW Leo/IRC+10216 envelope and (at an enlarged scale) of the binary star system with a mass ratio 4:1 and eccentricity 0.92, orbiting in the plane of the sky.