Small scale structure of IRC+10216 : a key to time dependent chemistry.

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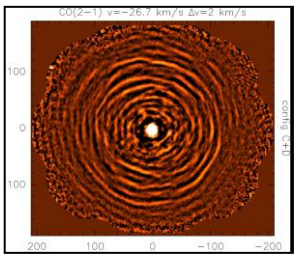
IRC+10216/CW Leo is the closest high mass loss AGB star (D ≃ 130 pc). It is surrounded by a spherical envelope with an exceptionally rich molecular content. Over 80 molecular species have been detected in this envelope, which have largely contributed to our understanding of circumstellar (CS) and interstellar (IS) chemistry. IRC+10216's outer envelope expands radially at a nearly uniform velocity (14. 5 km/s, or 1'' per 50 years). This remarkable property and the envelope large angular size make it a unique probe of time-dependant chemistry over timescales of thousands of years.



Using the SMA, PdBI and the IRAM30-m telescope, we have investigated the structure of IRC+10216 at angular resolutions of 1'' to 30''. We have studied the spatial distributions of a score of molecular species (C-chains, metal compounds, anions,..) as well as that of the molecular gas. The latter is best traced by the CO line emission, up to the CO photodissociation radius R_{phot}~ 180''. It yields a lookup time ≃ 10^4 yr on the mass-loss process. The CO map (synthetized beam 3'') reveals a spectacular pattern of thin spherical shells atop a broad centrally peaked pedestal (Fig. 1). It teaches us about the clumpiness of the gas, the presence of shocks and the penetration of the IS radiation inside the envelope – three powerful boosters of CS and IS chemistry. We will present the first results of our investigation by focusing on their implications for the radical and anion chemistry.

Références

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