

The 13th Torino Workshop on AGB stars & the 3rd Perugia Workshop on Nuclear Astrophysics



Contribution ID: 66

Type: Oral (in presence)

[C I] in the circumstellar envelope of IRC+10216

Thursday, 23 June 2022 14:55 (25 minutes)

IRC+10216 is the archetypal carbon-rich AGB star situated at a mere distance of 130 pc. The star exhibits a high mass loss rate of $2 - 4 \times 10^{-5} M_{\odot} / \text{yr}$. Until now ~90 molecular species are found in the circumstellar envelope (CSE) of this star alone. The carbonaceous atmosphere around the star shows intense emission of the CO molecule. Guelin et al. (2018) mapped this environment successfully in the CO (2-1) line with ALMA, SMA and IRAM PdB, where they revealed a pattern of concentric shells of extended emission. But the distribution of atomic carbon in the envelope is seldom studied towards this star. Keene et al. (1993) performed observations at various offsets from the central position of the star and inferred that the [C I] line is present in the form of shells in the envelope of the star. There is no atomic carbon present at the 0" position, but the line appears at 15" and at 45" away from the star, which was confirmed by van der Veen et al. (1998). Following this, we performed observations with the APEX telescope targeting the fine structure line at 9 different offsets, with an increment of ~6.5" from the star, in the R.A. and Dec directions to get a precise position of the presence of the shell. We further modeled the spectral lines using the RATRAN radiative transfer tool to get constraints on the physical distribution of the [C I] line in this star.

Session

Stellar observations (photometry and spectrometry)

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Session Classification: Stellar Observations