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



Contribution ID: 26

Type: Oral (in presence)

## Dust production around carbon-rich stars: the role of metallicity

Wednesday, 22 June 2022 11:10 (25 minutes)

Most of the stars in the Universe will end their evolution by losing their envelope during the thermally pulsing asymptotic giant branch (TP-AGB) phase, enriching the interstellar medium of galaxies with heavy elements, partially condensed into dust grains formed in their extended envelopes. Among these stars, carbon-rich TP-AGB stars (C-stars) are particularly relevant for the chemical enrichment of the local and high-redshift galaxies.

We have investigated the role of the metallicity in the dust formation process from a theoretical viewpoint by coupling an up to date description of dust growth and dust-driven wind, including the time-averaged effect of shocks propagating into the circumstellar envelope, with the stellar evolutionary tracks computed with the FUNS code. We compare our predictions with observations of C-stars in our Galaxy, in the Magellanic Clouds and in the Galactic Halo, characterised by metallicity between solar and 1/10 of solar.

Our calculations explain the variation of acetylene molecules in the gas phase and dust content around C-stars derived from the IRS Spitzer spectra as a function of the metallicity. The wind speed of the C-stars observed at varying metallicity is fairly well reproduced by our description.

We predict the properties of the circumstellar envelope, including the wind speed, down to metallicities of 1/10 solar for different stellar masses, representative of diverse environments, including metal-poor star-forming dwarf galaxies. The model predictions can be tested with future observations performed by the Atacama Large Millimeter Array (ALMA) and the James Webb Space Telescope (JWST).

## Session

Dust and presolar grains

**Primary authors:** NANNI, Ambra (National Centre for Nuclear Research (NCBJ), Warsaw); Dr CRISTALLO, Sergio; Dr VAN LOON, Jacco, Th.; Prof. GROENEWEGEN, Martin A. T.

Presenter: NANNI, Ambra (National Centre for Nuclear Research (NCBJ), Warsaw)

Session Classification: Dust and presolar grains