Contribution ID: **51** Type: **not specified**

Radiation pressure in 3D hydrodynamical simulations of companion-perturbed AGB outflows

Tuesday 31 May 2022 11:00 (15 minutes)

The cool and dusty circumstellar envelopes of asymptotic giant branch (AGB) have for a long time been modelled assuming a spherical symmetry. High spatial resolution observations of these stars have shown that their surroundings exhibit a variety of complex structures. Most of these structures are believed to originate from the interaction of the AGB wind with an obfuscated, nearby, orbiting stellar or planetary companion. Due to the inherent three-dimensional nature of these structures, a detailed understanding of these objects and the dominant wind-shaping mechanisms can therefore only be obtained from advanced three-dimensional treatments. Hydrodynamics simulations (with both particle- and grid-based codes) in the literature show that some of the observed morphologies can indeed be reproduced. However, due to the large computational cost a lot of critical physics has been strongly simplified, or even omitted. It is in this context that we present our work on upgrading the way in which attenuation of the stellar radiation field affects the effective radiation pressure on the dust by abandoning the widely adopted optically thin limit in calculating the dust acceleration. In this talk I will present my master thesis project where I coupled a ray-tracer with the smoothed-particle-hydrodynamics code Phantom to calculate the dust acceleration everywhere in the wind, and how to make it feasible for on-the-fly calculations. I will present the implications of this new treatment on the dynamics and morphology of the AGB outflows by means of three-dimensional AGB binary simulations.

Presenter: ESSELDEURS, Mats (KU Leuven)

Session Classification: Parallel session