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The impact of dust from AGB stars to the chemical evolution of the ISM

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Asymptotic giant branch (AGB) stars contribute to the chemical evolution of galaxies through the dust grains they release into the interstellar medium (ISM). The detection of pre-solar grains in meteorites shows that at least some of the dust from AGB stars survives the transition into the ISM. It is likely that these grains act as seeds for further dust-growth in the ISM leading to the final observed interstellar dust. I will present a detailed analysis of the dust emission observed with Herschel/PACS at 70 and 160 micron towards wind-ISM interaction regions around a sample of 22 carbon and oxygen-rich AGB stars. My results show that there is a tendency for the grains in the wind-ISM interaction regions to be relatively large (approx. 2 micron), while several uncertainties that affect commonly made basic assumptions on interstellar dust (e.g., composition and morphology) become obvious. This may have severe implications for our understanding of interstellar dust and their effect on the chemical evolution of the ISM, and hence the impact of AGB stars on the chemical evolution of galaxies. Further, the dust observed in the ISM is distinctly different from the dust observed in the circumstellar envelopes around evolved stars. The physical conditions in the regions where the stellar wind interacts with the ISM may lead to significant reprocessing of the grains, strongly affecting properties like the size, structure, geometry, and composition of the grains. Our lack of understanding affects our knowledge of the chemical feedback to the ISM from evolved stars, and the origin of the cycle of dust in the ISM. Our results show a path forward in investigating the origin of interstellar dust, the cycle of dust in galaxies, and the effect on the chemical evolution of the ISM.

Primary author: MAERCKER, Matthias (Chalmers University of Technology)

Co-authors: Dr DE BECK, Elvire (Chalmers University of Technology); Dr MECINA, Marko (University of Vienna); Dr KHOURI, Theo (Chalmers University of Technology)

Presenter: MAERCKER, Matthias (Chalmers University of Technology)

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