

# **The inner dust shell of Betelgeuse detected by polarimetric aperture masking interferometry**

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The origin of the dust-laden winds from evolved stars remains mired in controversy. Characterizing the formation loci and the dust distribution within the first stellar radius or so above the surface is crucial to understand the physics underlying the mass loss phenomenon. After introducing the topic, I will present how we can use interferometric polarimetry to derive the fundamental parameters governing the dust structure at the wind base of evolved stars.

Particularly, I will report on near-infrared aperture masking observations of Betelgeuse in polarimetric mode obtained with the NACO/SAMPol instrument.

We detected a dust halo located at only  $0.5 R_{\star}$  above the photosphere (meaning a dust halo inner radius of  $1.5 R_{\star}$ ) despite the high temperatures at this proximity to the stellar surface. Fitting to the data under the assumption of Mie scattering, we estimate the grain size and density for various dust species. Although the data constrains the shell and size of its constituent grains, alone it cannot disentangle the composition of dust. However such a study can be attempted using comparison of the dust shell models with SPHERE/ZIMPOL measurements. Extrapolating to the visible wavelengths using radiative transfer simulations, we confront our model with SPHERE/ZIMPOL data finding that models based on dust mixtures dominated by forsterite and/or enstatite are most favored.

The presence of such a close dusty atmosphere yields profound implications for dust formation mechanisms around red supergiants. It is possible that the new dusty structure reported here could form the base of a scattering-driven wind following the theoretical predictions reported in Höfner (2008). This scenario would be particularly attractive since the observed grain size range also corresponds to what is observed in the interstellar medium.