

Workshop

Imaging of Stellar Surfaces

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Title:

Witnessing atmospheric motions in cool evolved stars with VLT/AMBER

Abstract:

Studies of the mass loss from stars in late evolutionary stages are of utmost importance for improving our understanding of not only stellar evolution but also the chemical enrichment of galaxies. Despite such importance, the mass loss from cool evolved stars is one of the long-standing problems in stellar astrophysics. Milliarcsecond resolution achieved by optical/infrared long-baseline interferometry provides a unique opportunity to spatially resolve this innermost key region. We have recently succeeded not only in imaging the surface of the red supergiant Antares in the 2.3 micron CO lines in unprecedented detail but also in witnessing, for the first time, the complex gas dynamics over the surface and atmosphere of the star. Our 2-D velocity field map of Antares reveals vigorous upwelling and downdrafting motions of large gas clumps in the atmosphere extending out to ~ 1.7 stellar radii. This suggests that the mass loss in red supergiants may be launched in a turbulent, clumpy manner. We will also present preliminary results of the velocity-resolved imaging of an AGB star. Our work opens an entirely new window to observe stars just like in observations of the Sun.