

Workshop

Stellar End Products: The Low Mass - High Mass Connection

ESO Garching, 6-10 July, 2015

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Title:

Testing Theoretical and Semi-Empirical Models of Red Supergiant Extended Atmospheres

Abstract:

There are no standard models for explaining the extended atmospheres and large mass-loss rates of red supergiants (RSGs). Theoretical models also face the additional challenges of significant stellar variability and that multiple physical processes may be in play. Advances in our understanding continue to be driven by high spatial- and spectral-resolution observations. In the early 1950's, high spatial-resolution optical spectroscopy revealed that mid-chromospheric scale heights in K4 Ib stars exceeded those from the assumption of hydrostatic equilibrium, and with the advent of space-based UV spectroscopy it was found that the density scale heights continue to increase outwards as the wind accelerates. Theoretical models have attempted to explain these extended atmospheres as a result of magnetohydrodynamic (MHD) wave pressure. Here we consider the pairs of single RSGs and their spectral-type proxies in eclipsing binary systems: alpha Orionis (M2 Iab) and VV Cephei (M2 Iab + B0-2 V), and lambda Velorum (K4 Ib) and zeta Aurigae (K4 Ib + B5 V) to give context to recent modelling and observational studies including convection simulations, MHD models, imaging, interferometric, and NASA-DLR SOFIA mid-IR EXES spectra.