Molecular Envelopes of M supergiants

Principal Investigator: Dr. Graham M. Harper

Institution: University of Colorado at Boulder

Electronic Mail: gmh@casa.colorado.edu

Scientific Category: COOL STARS

Scientific Keywords: RADIATIVE TRANSFER, GIANTS AND AGB STARS, ATMOSPHERES AND CHROMOSPHERES, STELLAR ACTIVITY, WINDS/OUTFLOWS/MASS-LOSS

Total Budget Amount: $83,000 (Univ. Colorado & GSFC with cost share)

Abstract

M supergiants have long been known to possess discrete shells of molecules, gas and most likely dust. These stars are now thought to possess quasi-static reservoirs of warm (1500K) molecules levitated above, but detached from, their photospheres, and are known as MOLspheres. This intriguing atmospheric component may be the site of material for future shell ejections or it may provide an environment in which hot, clean dust can form. Ultraviolet molecular electronic transitions are extremely sensitive diagnostics of warm circumstellar envelopes, and we propose a detailed non-LTE study of the UV signatures of CO and OH in HST spectra of the M supergiant Betelgeuse. This study will also be extended to a larger sample of stars observed with IUE. The results of this program will constrain the dynamic, thermodynamic and spatial properties of these molecules. We will test the hypothesis that the CO responsible for the observed GHRS UV absorption is part of the MOLsphere, and help complete the inventory of circumstellar molecules.

Investigators:

	Investigator	Institution	Country
PI	Dr. Graham M. Harper	University of Colorado at Boulder	USA/CO
CoI	Dr. Kenneth G. Carpenter	NASA Goddard Space Flight Center	USA/MD
CoI	Ms. Jessica E. Bartley	University of Colorado at Boulder	USA/CO

Number of investigators: 3