



The University of Western Ontario

Faculty of Science

Department of Applied Mathematics

APPLIED MATHEMATICS COLLOQUIUM

Date: Wednesday, November 7, 2007

Time: 2:30 pm

Location: Middlesex College Room 204

Disks surrounding B-emission stars: when detailed models meet interferometry

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Abstract:

Many massive stars are embedded within gaseous circumstellar matter; sometimes dust and molecules are also present. Though the disks are sometimes too small to be detected directly, this material can be detected in the spectrum of radiation we observe from the star. Often, the circumstellar material has a disk-like distribution, but the physical processes that form and maintain these disks are not well understood. Be stars are an example of rapidly rotating, hot stars, whose spectra at optical wavelengths show both hydrogen emission lines and, frequently, emission lines from singly ionized metals due to the presence of a disk.

We have computed theoretical models of circumstellar disks for Be stars, using a non-LTE radiative transfer code which incorporates a number of improvements over previous treatments of the disk thermal structure, including a realistic chemical composition. These models can predict spectral line profiles and equivalent widths, spectral energy distributions, and continuum polarization. Models with accurate thermal structures and radiation fields are essential to interpreting observations correctly. These models can also predict images on the plane of the sky in important wavelengths and are therefore ideally suited for comparison with interferometric observations. I will demonstrate that our models can be constrained by direct comparison with optical interferometric observations for the H α emitting region and by contemporaneous H α line profiles. Detailed comparisons of our predictions with H α interferometry and spectroscopy place very tight constraints on the model free parameters for these star-disks systems.