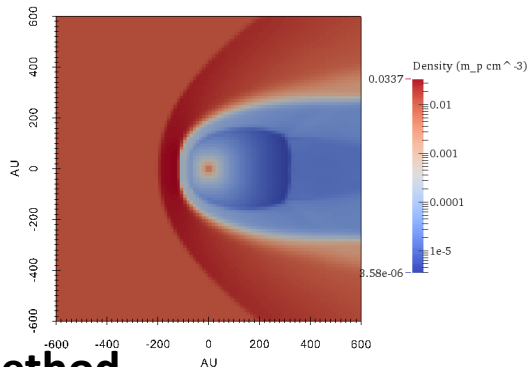


Modeling astrospheres according to observable stellar parameters

Senior Honors Thesis by Greg Szytko
Advised by Prof. Hans Müller

Goal

Develop a model for simulating stellar winds and astrospheres of cool main-sequence stars using only readily observable parameters.

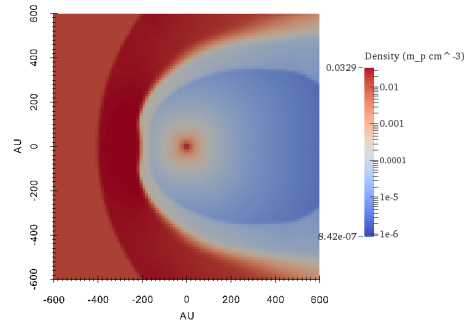


Method

- Use *Athena++* to conduct 3D hydrodynamic simulations of stellar wind + interstellar medium flow
- Integrate observable parameters as inputs to the simulation generator:
 - Radius
 - Mass
 - X-ray Luminosity
- Compare different models that map from observables to simulation parameters by applying these models to different stars

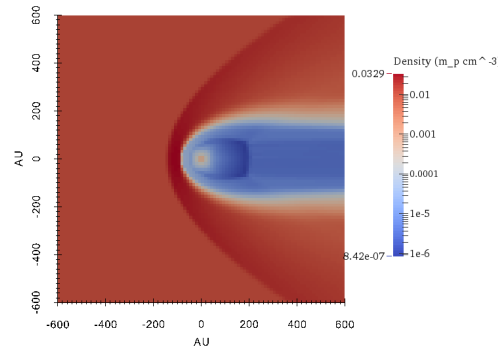
Case Study: 36 Ophiuchi B Wood et al. (2002)

Used observations of Ly- α absorption to correlate mass loss and X-ray flux



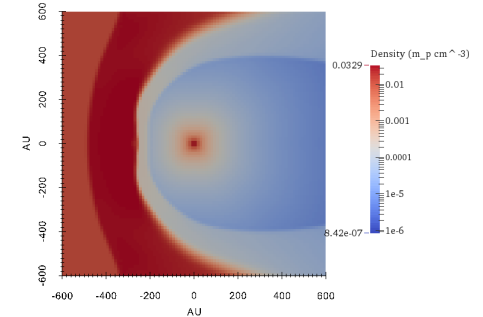
Cohen (2011)

Analytical model of mass loss based on solar observation



Johnstone et al. (2015)

Used 1D hydrodynamic simulations of thermally-driven winds to correlate base temperature and mass loss



AU Microscopii

Mesquita & Vidotto (2020)

Used 1D MHD simulation of Alfvén wave-driven winds to correlate base density to wind parameters

