DISCUSSION (Charbonneau)

SHORE: Observers should look harder to try to find eclipsing Am and related stars. This would be the best way to place limits on the rotation as an input for the circulation calculations.

I have a theoretical question. The circulation pattern depends on the rotation law (as a function of latitude). Have you compared Tassoul's calculations against Zahn's to see what effect the rotation law has on the abundances and mixing?

CHARBONNEAU: The rotational velocity statistics for Fm-Am stars are pretty well understood. Abt and Levy (ApJ Suppl, 59, 229, 1985) showed that low rotation ($v_e \lesssim 100$ km s^{-1}, say) is a necessary and sufficient condition for the appearance of the Fm-Am phonomenon. So the problem of distinguishing v_e from $v \sin i$ is not so critical here.

We use the Tassoul and Tassoul (ApJ Suppl, 49, 317, 1982) meridional circulation solutions. Within this framework, the circulation patterns (i.e., the morphology of the circulation streamlines) is independent of the rotation rate, and the circulation speed on a given streamline is proportional to the square of the rotation rate. Zahn's meridional circulation solutions appeared on the scene only a few months ago, and no circulation patterns (or flow velocities) have yet been computed in detail. But we do plan to do so, and to investigate the compatibility of this circulation with diffusion models for CP stars.

GRIFFIN: In a study of composite spectra from wide binaries (primary is a late-type giant, secondary is a B or A-type dwarf) we are finding that a surprisingly large proportion of the secondary stars are peculiar in some way. One system, τ Per, has a secondary that is almost certainly a λ Boo star. The giant does not appear to have a metal-poor composition, so accretion of metal-poor material onto the dwarf seems unlikely. We believe that the giant has a hot solar-like corona, so perhaps it also has a substantial wind. Could the existence of a λ Boo star in such a system provide useful constraints on the possible mechanisms you are suggesting for the origin of the λ Boo phenomenon?

CHARBONNEAU: From my standpoint, detection of CP stars in binary systems is indeed quite interesting, but mostly because it provides a handle on their ages. Once the accretion hypothesis has been developed in a more quantitative fashion, the observations you describe are likely to provide useful constraints, but for now I prefer not to engage in speculation.

HUNGER: Is viscosity included in your theory, i.e., the interaction between the different ions? Viscosity may be important when you have ions downstreaming when accreted, and other ions upstreaming due to radiative acceleration.

CHARBONNEAU: We treat the diffusion problem in the trace approximation, using an average charge for each chemical species. This average charge is obtained from ionization equilibrium. There is no room in our formulation for ion-ion collisional coupling. However, we do include collisional coupling with the background constituents. For calculations pertaining to stellar interior conditions this is an excellent approximation. The mechanisms that you describe become important when dealing with chemical separation in the atmosphere (and corona, if any).