The A-Star Puzzle
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Panel discussion section F

CHAIR: **D.W. Kurtz**

SECTION ORGANIZER & KEY-NOTE SPEAKER: C.R. Cowley
INVITED SPEAKERS: T. Ryabchikova, G.M. Wahlgren
CONTRIBUTION SPEAKERS: I.Kh. Iliev, S.J. Adelman, T. Ryabchikova

Discussion

BALEGA: Is there any sense in performing a speckle interferometric survey to search for secondaries among the Ap stars? As a rule, the secondary companion will be always fainter and cooler than the primary star. Therefore, its input into the common spectrum will be negligible. A good example is 53 Cam with a magnitude difference between the components of 1.2.

ILIEV: Definitely "yes." Even if the secondary is 4 or 5 magnitudes fainter than the primary, its contribution to the overall spectrum can be crucial, as it was already shown for 17 Lyr (HD 178449). Since the presence of the secondary provides significant information about the entire system, there are no advantages in neglecting the companion.

RYABCHIKOVA: It depends on how much fainter is the secondary, because if it is some 5 - 10 times fainter in the violet it might be much brighter in the red and infrared regions which astronomer are now starting to analyze spectra. If we neglect the cool secondary we could make some errors in any analysis. I have an example when the difference was 2 magnitudes. α And A has $T_{\rm eff} = 13800$ K, but we clearly see the secondary lines ($T_{\rm eff} = 8000$ K) in the even not very red spectral region at 4950 Å. We used these secondary lines for accurate radial velocity determinations.

KURTZ: Comment. With your NLTE line profiles for Nd II and Nd III (Mashonkina *et al.* 2005, *These Proceedings*, 315) you have reduced the line strength substantially with NLTE comparing to LTE. That is going to change the diffusion calculation. Earlier Georges Alecian raised a problem regarding the small optical depths. It would be very interesting to know if one can perform a diffusion calculations that produces the kind of stratified layers of the Nd and Pr that Ryabchikova sees in these stars.

LEBLANC: Of course, if we have a sufficient atomic data it is possible to do calculations for these elements in NLTE using a code like PHOENIX. However, the addition of new elements to this code is nontrivial. We wish, in the not too distant future, to add more rare earth elements to our stratified model calculations.

GRIFFIN: Comment. The more we study A-type stars, the more we seem to be faced with samples of one. At the same time, Wahlgren is encouraging us to use the properties of stars to investigate parameters from a fresh perspective "across borders." With so many samples of one! This is calling for a more concerted effort from us all. Bear in mind that the more we look in detail at an A-star the more likely it is to prove abnormal in some aspect.

WEISS: I would like to recall a statement of Cowley that he made some years ago at another conference: "If a star is normal it depends on the spectral resolution one was using".

ADELMAN: There are some unique stars and we do not know if similar stars exist. If we have a complete sample down to some limiting magnitude, then estimates of the frequencies of the various types can be obtained. To find photometrically interesting stars often requires a large amount of observing on a small telescope, at least 200 good sets of differential measurements. Additional observations often are needed to follow up an initial discovery. We know only a small fraction of what could be learned as most published photometric sets of data contain 25 or so observations and as there are only a few active photometric observers of normal and peculiar A stars.

KURTZ: In Ryabchikova's first talk she brought up the problem of our discrepancy with the non-detection of magnetic variability and pulsation time scales in some roAp stars. Leone and I observed γ Equ with the Galileo telescope and claimed to have detected a 250 Gauss pulsation in the magnetic field strength in that star with a 12 min time scale. If this is real, as the pulsation mode moves around the star it will sample the magnetic field horizontally or vertically at different places. Further if this is true it gives a new three dimensional handle on the magnetic field structure. Kochukhov, Ryabchikova, and I observed that star using the 6-m telescope and we found absolutely nothing. Kochukhov and I have exchanged data. I find no variations in his data but I do find variations in our data. I have also re-reduced the data from the Galileo telescope using both the standard technique of circular polarization and the technique that Leone and I used originally; both of them gave the same resulting signal. We do not know if the star changed or there is something wrong with the data sets. So for the time being this all simply remains unclear. It may be true or it may not be true. We do not know where the problem is, we are searching for more ideas about where about to go: to a 10 m telescope or to another star.

RYABCHIKOVA: The first step should be some independent analyses of the two data sets and then we will have to decide.

KURTZ: I agree. It would be very good then to do.

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