DISCUSSION (Landstreet; Mathys; Wehlau & Rice; Hatzes)

HATZES: (To Landstreet) In your modeling of the magnetic field variations of 53 Cam you used dipole, quadrupole and octupole. Can you get a reasonable fit using a simple decentered dipole?
LANDSTREET: A simple decentered dipole is closely equivalent to an expansion using dipole and quadrupole terms only. I found that using only a dipole plus quadrupole led to a far poorer fit to some of the magnetically broadened Cr lines of 53 Cam than was found for a fit with dipole, quadrupole and octupole. The octupole component is definitely required, i.e., the field is not well described by the decentered dipole model.
BROWNE: How do you reconcile the large spread of magnetic periods with rotational periods? It is difficult to understand why a rotational slowing mechanism should affect some stars and not others.
LANDSTREET: The large range of periods seen in the known magnetic Ap and Bp stars, which often rotate far more slowly than other A and B stars, are probably produced by strong angular momentum loss made possible by the magnetic field: if a stellar wind occurs, or if the star passes through an interstellar cloud, the magnetic field allows much angular momentum to be transferred to the circumstellar matter.
LECKRONE: I've wanted to know since my youth why some B- and A-type stars have strong, ordered magnetic fields while others do not. What are your current thoughts about the origin of these fields and the physical distinction between magnetic and non-magnetic stars?
LANDSTREET: The distribution of fields detected in magnetic Ap and Bp stars rises from a weakly populated high-field tail towards lower field values. Even among relatively bright stars of this group, some do not have detectable fields. It seems quite possible to me that other types of A and B stars are simply ones in which fields may be present, but weaker than some critical value, i.e., the fields in A/B stars may form a continuous but broad distribution with the magnetic Ap stars in the high-field tail.
SHORE: I hope I can make a conjecture. John, I think you've put the seat of the origin of the field in the right stage of the evolution, in the pre-main sequence stage. If the star succeeds in building a strong field while convective, and then retains this as a frozen-in multipolar field when the star turns radiative, then the star arrives on the ZAMS having a very complex field and slow rotation. The initial condition looks inverted; initially rapid rotators become slow rotators on the main sequence by the large field-mass loss moment arm (large Alfvén radii).
KROLL: (To Wehlau) Model atmospheres are a real problem in abundance mapping, since T_{eff} and $\log g$ might well be local quantities. Has anyone tried to compare maps done with two ions of the same element?
WEHLAU: This has not been done explicitly, but we have looked at maps produced from two stages of ionization and did not see any obvious differences.
KHOKHLOVA: Cr I and II, and Fe I and II, have been used.
PISKUNOV: A general comment: The two types of models for magnetic field distribution on the surface of Ap stars can be obtained with the surface imaging techniques. One is a map of magnetic field vector. This full reconstruction requires high quality observations of all four Stokes parameters. If the amount of observations is limited the second sort of models can be produced assuming a certain field model (dipole, radial field, etc). This kind of model will require

extra arguments to support the selected constraints which can be provided by the technique suggested by Mathys.

POLOSUKHINA: (To Mathys) Do you have new observations of β CrB? With your technique observations in 1991 are very important in the life of this star as this is the epoch of periastron passage!

MATHYS: No.

DWORETSKY: (To Mathys) Is your $v \sin i$ for HD 137909 (10 km s^{-1}) not seriously incompatible with Preston's published value ($\lesssim 3$ km s^{-1})?

MATHYS: The values of $v \sin i$ that I give for slowly rotating stars (rotational Doppler effect small compared to the instrumental profile) are only upper limits, Therefore, there is no inconsistency for HD 137909.

ADELMAN: (To Hatzes) When were your observations of 56 Ari made and what value of $v \sin i$ did you find?

HATZES: The data were taken in 1985-87 and I don't recall the exact value of $v \sin i$ but I think it was about 170 km s^{-1}. I'll have to check this.

ADELMAN: In 1976, Steve Shore and I predicted that magnetic Ap stars should precess. In my poster paper with Diane Pyper, I discuss recent UBV photometry of 56 Ari which differs substantially from previous observations by Blanco and Catalano and by Hardie and Schroeder. A geometric consequence will be that the value of $v \sin i$ should periodically vary. Thus, knowing that your value of $v \sin i$ was different from ours is of interest. If precession occurs, through what value will the inclination angle have to change to help improve the elemental maps of this star?

HATZES: Changing the inclination by $\pm 20°$ should not change the resulting map significantly. Changing the inclination more than this should be noticeable by the effect on features near the equator. The best reconstructions are made for $i = 30° - 60°$.

MICHAUD: It is very encouraging to see the improvement in the quality of the $\vec{H}$ field determinations and of the maps of abundances. Only a coverage of all physical properties of individual stars makes it possible to do particle transport calculations for a star.

https://doi.org/10.1017/S0252921100020595 Published online by Cambridge University Press