DISCUSSION (Krause and Scholz)

DWORETSKY: What is the spectral type of ν Cep?
OETKEN: A2 Ia.
DOLGINOV: What is the evidence that in this case, in the presence of convection there is no differential rotation?
KRAUSE: Convection with no differential rotation seems, indeed, to be controversial, since it is generally accepted that the differential rotation of the Sun is caused by convection. This theory, however, also reveals a certain dependence of the differential rotation on the characteristic parameters of the convection; this is also true for the dynamo effect. These results (published by Rüdiger and Hathaway) state: with growing angular velocity, the convection takes such a structure that differential rotation becomes weak, and the dynamo effect favours a magnetic field with no symmetry with respect to the rotation axis.
SEVERNY: How sensitive are your conclusions to the rather large scatter of points in the observed magnetic curve?
KRAUSE: The crucial point is the existence of the field, and its origin. Our data do not allow us to define the magnetic geometry very well, but the existence of the field is established.
MÉGESSIER: Is there any photometry of ν Cep that would indicate quasi-periodic or periodic light variations? The B supergiants are known to exhibit such variations; what is the case for A supergiants?
KRAUSE: As far as we are aware, there is no light curve for this star. We have found a number of possible periods from the radial velocity data. Perhaps Dr. Gerth can comment.
GERTH: The significance of the magnetic field and the period was established by superimposing individual plates and examining the linear dependence of the z-value of $\Delta\lambda/\lambda^2$. The search for a period was statistical. We also measured radial velocities, and for this star the radial-velocity period is half the magnetic period.
KROLL: The rotation is slow, yet the magnetic field is fairly strong. Did you make quantitative estimates to see if the dynamo can support the field?
KRAUSE: Whether or not the rotation is slow depends on the time scales relevant to dynamo excitation. These are the decay time of the magnetic field in a convective cell, and the lifetime of that convective cell, or the turnover time. Because of the large geometric dimensions, the first time scale is surely large compared with the rotation period (for a granule in the solar convection zone, this decay time is about 30 years). I do not know whether there is reliable information on the lifetime of a convective cell in a supergiant. For other reasons (given in my reply to Dr. Dolginov earlier) we expect a large turnover time. The dynamo effect will be weak if both these time scales are very small compared with the rotation period.
HENSBERGE: How many supergiants were included in your search for magnetic fields? Have any others shown signs of a magnetic field?
KRAUSE: May I ask Dr. Oetken to answer this question?
OETKEN: We observed many stars, but our first inspection of the spectrograms showed that ν Cep has some remarkable features, so we

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investigated this star first. So far no one else has found magnetic fields in supergiants, and we are wondering if this is a special star. We do not yet know whether magnetic fields are characteristic of other supergiants.

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