chromium is hindered by the lack of work on the diffusion of chromium in stellar atmospheres, but if chromium behaves as silicon and is depleted in regions where the field lines are vertical, then the abundance distribution for \( \epsilon \) UMa and \( \omega \) Her may be indicative of a quadrupole field.

31.18
Doppler Images of Spotted RS CVn and FK Com Stars
S.S. Vogt, G.D. Peureux, and A.P. Hatzes (Lick Obs.)

We present an improved version of our Doppler Imaging method which now incorporates maximum entropy image reconstruction techniques. The Doppler Imaging method is discussed, and its power is demonstrated by recovering a test image of a star with the first author's surname written in dark spots around the star. We have used the technique to derive resolved images of two spotted late-type stars from high signal-to-noise spectral line profiles obtained at Lick Observatory. One star is the RS CVn-type star HR 1099, and we show images from 1981, 1984, and 1985. The other star is the FK Com-type star HD 190178, for which we show an image from 1985. Both stars show surprisingly similar spot distributions. In each case, there is a single large cool spot straddling the pole, and a number of small cool spots at low latitudes. On HR 1999, the polar spot of 1981 has an attached protuberance which extends to lower latitudes. This protuberance may well be the remnant of the large active region complex which emerged in 1978 at low latitude, migrated poleward, and, in 1981, is seen merging with the long-lived polar spot. The polar spot of HD 190178 has a number of such protuberances, though of smaller size. We expect that the small low latitude spots on each star will migrate poleward to join the polar spot, and suggest that the observed long-lived polar spots are the result of the poleward migration and merging of many active region complexes. If true, the poleward migration of starspots suggests that dynamo activity on very rapidly rotating stars is qualitatively different than that seen on our Sun, but agrees with theoretical models of \( \alpha \)-dynamos operating in rapidly rotating convection zones. Recent models suggest that the solar dynamo may operate only in the radiative zone immediately beneath the convection zone. We suggest that the observed rotational trigger velocity for the appearance of large spots on late-type stars marks the transition from solar-type boundary layer dynamo to distributed dynamo, which occur only in more rapidly rotating stars.

31.19
First Results of an IUE Study of the Ultraviolet Spectra of Short-Period RS CVn Systems
S.A. Drake (SASC Tech. at NASA / Goddard), T. Simon (NASA / Goddard), and J.L. Linsky (JILA, U. Colorado)

We are in the process of conducting an IUE research program to obtain low-dispersion, short-wavelength spectra of RS CVn systems that have orbital periods less than about two days. These systems have F or G main-sequence primaries, and, due to their being rotationally synchronized by tidal interactions, exhibit extremely high activity levels, as evidenced by their chromospheric Ca II and Mg II resonance line emission, and their coronal thermal X-ray and non-thermal radio continuum emissions. The study of such solar-type stars that are rotating ten to fifty times faster than the Sun should provide considerable insight into the behavior of the dynamo mechanism that is believed to be responsible for such activity. In particular, we hope to elucidate the functional dependence of surface activity, as manifested in the strengths of the emission lines of chromospheric and transition-region species, on the rotational rate, as characterized, for example, by the Rossby number. We are also seeking to determine the extent in spectral type of the RS CVn phenomenon; it has previously been pointed out (e.g., Fekel, Moffett, and Henry 1986, Ap. J. Suppl., 60, 551), that the short-period RS CVn's with F and G V primaries, and the BY Dra variables of K and M V spectral type, appear to form a continuum of activity. Our recent detection of strong C IV emission in the F2 IV-V binary IX Per (\( \log P_{\text{orb}} = 1.33 \) days) represents the hottest RS CVn-like system known to date, and suggests that it would be worthwhile to observe even earlier systems such as UU Psc (F1 IV-V+F1 IV-V; \( P_{\text{orb}} = 0.84 \) days) so as to obtain SWP-I0 spectra that are well-exposed in the neighbourhood of the C IV \( \lambda 1550 \) resonance line.

This research has been supported in part by funds from NASA through its IUE Guest Observer program.

31.20
Starspot Models for Short-Period RS Canum Venaticorum Systems
M. Zeilik (U. New Mexico) and E. Budding (Carter Observatory)

We perform an analysis of selected light curves for the short-period RS CVn group: UV Psc, XY UMa, RT And, SV Cam, BH Vir, ER Vul, WY Cnc. and CF Cyg. We optimize the photometric fitting parameters for the "distorted" light curves in order to derive the distortion wave for each system. We then fit a dark circular spot model to the distortion wave to infer the longitudes and sizes of one or two spot groups presumed to account for these effects. Using these spot properties, we "clean" the original light curves of their distortion waves and find new, optimal solutions, which give the adopted geometrical, orbital, and physical parameters for the stars of these systems, which fall on the lower end of the main sequence. We conclude that the secondary stars in these systems are all main sequence rather than subgiants.

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Session 32: The Large Telescopes
10:15-12:15 (Civic Auditorium)

32.01
Planning the National New Technology Telescope
Jacques M. Beckers, (NOAO/ADP*)

The National New Technology Telescope (NNTT) Program includes the 16-meter collecting diameter NTT as well as its 8-meter Southern Hemisphere Companion. The NNTT has a multiple-mirror design consisting of four 8-meter diameter telescopes. With an optical coalignement/cophasing system, the light of the four telescopes is combined at a common focus in which the ultimate angular resolution will be determined by the 22-meter optical baseline. This resolution can be obtained in the form of complete images: direct imaging in the far infrared (0.1 arc sec at 10\( \mu \)m), imaging with adaptive optics in the near infrared (0.02 arc sec at 2.2\( \mu \)m), or image restoration in the visible (0.005 arc sec at 0.5\( \mu \)m). The NNTT will be an outstanding facility especially for doing high angular resolution, high sensitivity infrared studies of galaxies, star forming regions, and planets, as well as for high spectral resolution visible observations of stars, galaxies and quasars. For the study of the relatively nearby objects that are unique to the Southern Hemisphere, like the Magellanic Clouds, we plan an 8-meter Southern Hemisphere Companion to the NNTT. An extensive technology development program, including adaptive optics interferometric techniques and the production of the high-quality mirrors needed for the NNTT Program, is underway at NOAO and at the University of Arizona Mirror Laboratory, under contract with NOAO.

*Operated by the Association of Universities for Research in Astronomy, Inc., under contract with the National Science Foundation.

32.02
The Columbus Project - An 11-m Optical Infrared Telescope
E.R. Capriotti, J.A. Baldwin (Ohio State U.)

A consortium including the University of Arizona, The Ohio State University and The University of Chicago will