1986BAAS...18..985A

...Wolf 630, and AU Mic to major 80 mJy flares at 20 cm on L726-8A and AB Leo. These latter two flares also showed evidence for broadband emission, which places strong constraints on the possible mechanisms for stellar microwave flares. In particular, a flare on AB Leo lasted for two hours at 1415 MHz with no sign of flaring at 1515 MHz. The high degree of polarization (90%) and large brightness temperatures (>10^12 K) support the view that a coherent emission mechanism such as cyclotron maser may be involved. Simultaneous flaring from both members of the binary systems UV Ceti (L726-8B), EQ Peg, and AT Mic have been observed at 20 cm. The possibility of coordinated emission from the individual stars in a binary system is discussed. A dynamic spectrum of a flare on UV Ceti on July 3, 1986 has been obtained (Jackson, Kundu and White, Ap.J. (Letters), submitted, 1986) showing delayed emission at higher frequencies (in a sense opposite to what is normally observed in the Sun). This would be consistent with radiation associated with a disturbance propagating toward the stellar surface.

The hattedness (right or left) of the circular polarizations of microwave flare from the stars which have been observed most widely with the VLA, particularly UV Ceti, XZ Ori, and AB Leo has not changed for several years, raising the possibility that a stellar magnetic activity cycle is involved.

51.21
DYNAMIC SPECTRA OF MICROWAVE OUTBURSTS ON THE FLARE STARS
T.S. Rastian (U. Colorado) and J.A. Bookbinder (JILA)

In recent years, interest in the radio emission from M flare stars has been spurred by both observational and theoretical developments. The Very Large Array (VLA) has provided a wealth of new observational data at microwave frequencies of both quiescent and flaring continuum emission from M flare stars. Advances in the theory of cyclotron masers have provided a new mechanism for interpreting some heretofore unexplained phenomena (e.g., the extremely rapid time variability and the very high degrees of circular polarization) associated with some microwave outbursts. Dynamic spectra have been used profitably as a probe of the Sun's corona for many years. Motivated by the possibility of utilizing the frequency domain to constrain the various theoretical possibilities for coherent microwave emission, we have used the VLA in spectral line mode at 1.4 GHz to obtain the first dynamic spectra of stellar sources other than the Sun. Intense microwave outbursts were recorded on the M flare star UV Ceti (L726-8B), in addition to a prolonged period (~30 min) of complex activity on EQ Peg. A rich variety of 'light curve' morphologies, polarization properties, and structures across the 40 MHz band (e.g., narrow band spikes and drifts) were observed. We interpret these events in the context of both fundamental plasma emission and the cyclotron maser instability.

51.22
Kapd X-ray Variability of Quiescent Late-Type Dwarfs: Implications for Coronal Heating
C. W. Ambruster (JILA, Univ. of Colo. & NASA)*, S. Sciortino (Observ. Astron. of Palermo), and L. Golub (SAO)

Variability at greater than 99% significance is found for 16 of 19 active (dM and dE) late-type dwarfs observed by the Einstein IPC (0.2-4 keV). The amplitude (typically ~0%) and character of the variability appear to be independent of spectral type (Ambruster, Sciortino and Golub, Ap. J. Suppl., submitted). The stars in this sample, because of their relatively high activity levels, are presumably young. If older, nonemission line cool dwarfs show a smaller amount of quiescent variability, it may imply that local level variability is an inherent property of the mechanism which heats the corona, and is not a form of activity (such as flaring) which diminishes with time. If variability is absent in the older stars, it would suggest that there is a steady coronal heating mechanism which is independent of age and which is still present after the various types of activity have died down. In a new study, we report on the variability properties of all the clearly detected inactive late-type stars in the Einstein data base.

*Einstein Guest Observer.

Session 52: Stars by Ones and Twos
(First Floor)
Display Session

52.01
Apilical Motion in Conflict with General Relativity
A. C. Campana


AS Cam is an eclipsing binary system consisting of a 3.3 and a 2.5 solar-mass pair in an eccentric orbit (e = 0.17) with a period of 3.43 days. Like the eclipsing system DI Her (Grupe and Maloney, A. J., 90, p. 1519: 1985) and several others, AS Cam is an important test for studying relativistic apsidal motion, since the theoretical relativistic apsidal motion is comparable to that expected from the classical effects arising from tidal and rotational deformation of the stellar components. Accurate determinations of the orbital and stellar properties of the system have been made by Hilditch (P.A.S.P., 94, p. 519: 1972) and Khaliullin and Kozyreva (Ap. Sp. Sci., 94, p. 115: 1983), which permit the theoretical relativistic and classical components of the apsidal motion to be determined reasonably well: \( \Delta M_{\text{rel}} = 7.9 \times 10^{-6} \text{ deg/year} \), \( \Delta M_{\text{cl}} = 3.7 \times 10^{-3} \text{ deg/year} \). We have gathered timings of the primary and secondary minima from published sources and have supplemented these with eclipse timings from 1899 to 1920 obtained from the Harvard Plate Collection. Least-squares solutions of these eclipse timings reveal a small advance of the perihelion \( \Delta M_{\text{repl}} = 13.6 \times 1.5 \text{ deg/year} \), in agreement with that of Khaliullin and Kozyreva who find \( \Delta M_{\text{repl}} = 16.0 \times 1.3 \text{ deg/year} \). This observed apsidal motion is about one-third that expected from the combined relativistic and classical effects, \( \Delta M_{\text{repl}} - \Delta M_{\text{cl}} = 43.6 \times 3.5 \text{ deg/year} \). Thus AS Cam joins DI Her in having an observed apsidal motion less than that predicted by the theory.

Observations with the IUE satellite were undertaken to reveal possible additional causes for this conflict, such as: 1) a third member of the system, 2) stellar winds which carry away energy from the system, 3) induced stellar pulsations caused by the eccentric orbit, and 4) the presence of a circumbinary cloud. This work was partially supported by NASA grant NASA 83-283 and NASA 86-110.

*Guest Investigators with the IUE Satellite (NASA).

52.02
HD 27709. An Unusual Radial-Velocity Variable
S.L. Morris (U. Puerto Rico), C.T. Bolton (U. Toronto)

The published period of 10.67 days for the radial-velocity data is found to be an alias of the correct period, 0.912679 days. Photographic photometry obtained in 1938 suggests that this is an eclipsing binary, but no eclipses are evident in recent photometry. If the star does eclipse, the mass function implies a mass ratio of q = 0.50. Recent spectra indicate that this is a line-profile variable, and some of the observed behavior may be explained by non-radial pulsation in the B3V primary.