Session 16: Stellar Spectra

16.17 Probabilistic Search for New Carbon Stars Using a Bayesian Technique: Autoclass

J. E. Geoch, P. Cheeseman, M. Self, J. Stutz, F. Gerbauau, and W. Taylor

We have conducted a search for carbon stars in the IRAS LRS data base using an artificial intelligence automatic classification technique. The software package named Autoclass II (Cheeseman et al. 1988) reclassified all LRS Spectra into 78 classes and 9 metaclasses. Classes with large populations were split into subclasses. The classifications are based on the spectra only, without any help from astronomers. Then classes and subclasses were selected for carbon star membership based upon spectral characteristics in the LRS spectrum and other catalog associations.

The technique is successful in reproducing the well known carbon stars with strong spectral signatures and the new carbon stars in the list compiled by Little-Marenin et al. (1986). There are also many new carbon stars in addition to the above lists.

The spectra fall into the following classes:
1. SiC emission
2. Gas absorption bands with and without SiC emission
3. α-C-H emission bands with and without MgS emission
4. Feature less continua
5. Interstellar silicate absorption

References:
2. Little-Marenin, I. et al., 1987 Astron. Jour. 93, 663

Session 17: Galaxies

17.11 HI OBSERVATION OF THE HOT-SPOT BARRLED GALAXY NGC-4314

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HI has been detected in emission from the barred galaxy NGC-4314. The observations were performed using the Arecibo 305m antenna. A double peaked line was detected with a mean heliocentric velocity of 982 km/s and an integrated flux of 0.2 Jy km/s. The corresponding mass in atomic hydrogen is of the order of 2 to 4x10^6 M⊙. An off-center non-detection for HI emission suggests that the neutral hydrogen is concentrated in the innermost central region. It is the innermost central region that also shows radio continuum emission and a bright optical spiral structure (Garcia-Barreto and Piemba 1985 B.A.A.S. Vol. 17, No. 4, p. 893).

* The Arecibo observatory is part of the National Astronomy and Ionosphere Center, which is operated by Cornell University under contract with the National Science Foundation.

J.A.G-B acknowledges partial financial support from CONACyT(Mexico).

Session 19: Solar Atmosphere

19.08 Resonance Absorption of Solar p-Mode by Sunspots

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Braun, Duvall, and Labonte (1987) have reported that the power in outgoing p-modes in the vicinity of sunspots is significantly less than the incoming power. We consider the possibility that the energy deficit is due to resonance absorption, which occurs when the sunspot boundary has a nonzero thickness. We use a simple planar analysis to examine the conditions required for resonance absorption, and to estimate the absorption coefficient. We find that resonance absorption can be significant under certain circumstances: the incoming waves must approach the sunspot magnetic field at angles less than about 40 degrees, the sunspot density must be no more than half the exterior density, and the ratio of specific heats outside of the sunspot must be substantially less than 5/3. On the whole, resonance absorption probably cannot explain the substantial loss of p-mode power observed by Braun, Duvall, and Labonte over a substantial range of frequency and azimuthal order. Nonetheless, some waves can be significantly absorbed by this process and it might have observable consequences. One possibility is that the running penumbral waves are produced by resonant absorption of p-modes at the subsurface sunspot boundary.


19.09 Full Disk Call K-line Observations of the Sun with a One-Inch Telescope (CPTD)


Full disk observations of the sun are made daily with the Cartesian Full Disk Telescope (CPTD). This telescope and photometer obtain an image of the sun with a 512 element linear diode array by letting the earth's rotation scan the array. Beginning in late March, 1988 observations began with a 10A FMEM filter centered approximately on the Call K-line. The plage and network areas determined from these images will be compared with those from a 100A bandpass filter centered at 3920Å. The irradiance excess estimated from these data will be presented and discussed. This work has been partially supported by NSF grant number AST-860309 and NASA grant number NAGW-688.

Session 28: Solar Theory

28.13 Nonlinear Simulations of Filament Condensation

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D.D. Schnack (SAI/San Diego)

The radiative thermal instability of a magnetized, coronal plasma is believed to initiate the formation of solar filaments. We have studied the nonlinear evolution of the subsequent cooling and condensation by means of two-dimensional, fluid simulations of a radiatively-unstable, coronal plasma immersed in a sheared magnetic field. In the equations of compressible magnetohydrodynamics. The energy equation includes terms representing adiabatic heating, Joule heating, radiative cooling, and fully anisotropic thermal conduction. The structure of the