include bound-bound and bound-free transitions of H, He I and II, C II-III, N II-IV, O II-IV, and Mg II. Opacity sampling was done to attempt to account for blanketing due to the elements with atomic weights 21-28.

Mass loss is characterized by a parameter describing the asymmetry of the C IV doublet (1548, 1550 Å). Roughly half the program stars show evidence of a wind/winds appear to ‘switch on’ at around 26000-27000 K at a log g of 4. The degree of asymmetry of the C IV doublet shows a clear monotonic increase with temperature; it does not correlate well with luminosity. No abundance anomalies in He and C are apparent.

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42.04

Can Magnetic Tube Waves Account for X-ray Emissions Observed from Late-Type Dwarfs?  
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There is a growing evidence for inhomogeneous and locally strong magnetic fields in stellar atmospheres. It is reasonable to assume that stellar magnetic inhomogeneities may be similar to the ‘flux tube’ structures observed in the solar atmosphere outside sunspots. If so, then magnetic flux tubes may become ‘windows’ through which the wave energy generated in stellar convective zones is carried by various types of waves to the overlying corona. Now, it is well established that X-ray emissions observed from late-type stars vary significantly for a given, fixed spectral type, and a principal test for any heating theory is to account for these variations (as well as, of course, the mean level of heating). It has already been shown that both acoustic wave heating models, and models based on MHD wave heating in the presence of uniform magnetic fields, fail to pass this crucial test. Here we present a wave heating theory that may formally account for this major observational constraint. We find that wave energy fluxes generated in the form of transverse tube waves in stellar convective zones show wide variations for a given spectral type, variations which can be attributed to changes in two free parameters: the tube magnetic field strength and the stellar flux tube filling factor. We discuss the range of these parameters for which the wave energy fluxes may account for the observed levels of X-ray emission, and compare the obtained magnetic field strengths and filling factors with observational data.

42.06

The Variable Star Population of NGC 1866

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We report the discovery of new classical Cepheid and long-period variables in the young, populous LMC cluster NGC 1866. The new Cepheid discoveries bring the total number of probable Cepheid variables to 23. Among the stars for which analysis is complete, we find one overtone pulsator and a low-amplitude fundamental pulsator. Furthermore, two long-period variables have been discovered in this survey raising the possibility of a zero-point comparison for these two important standard candles (once complete lightcurves have been obtained for the LPV’s). This new data provides an excellent sample for comparison with evolutionary models of intermediate-mass stars, since the variable stars have a common age, metallicity, reddening, distance, and mass. We discuss some of the constraints on the instability strip provided by the NGC 1866 photometry.

The practical aspects of undertaking a discovery survey for variables stars in regions of high crowding are also discussed.

42.07

Why Carbon Stars appear to be Underabundant

B. M. Lewis (Arecibo).

The prominent “gap” observed in the (25-12)μm color distribution of IRAS sources, as they evolve from colors typifying a black body photosphere with T ≥ 2000 K to those reflecting the existence of a circumstellar shell with T ≤ 1000 K, is only exhibited by oxygen-rich stars. Carbon stars (represented by 4n sources) do not exhibit this feature. This observation is readily explained by the ability of carbon to form refractory grains at lower pressures and much higher temperatures than silicates. In consequence, the evolution of C-rich stars, both in initiating mass-loss to generate a circumstellar shell and in a factor of ~15 reduction in the duration of a mass-losing phase, is more rapid than the evolution of C-rich stars. This explains the apparent underabundance of carbon stars at 10-20 % in the Mira progenitor stages to planetary nebula formation, while they have ~ 62 % abundance among planetary.

Implications following from this result include:-  
(1) significant mass-loss begins with the ability to form dust, circumstellar masers are rarely present in sources without dust, but are observed in sources up to the red edge of the (25-12) μm "gap";