I obtained y and b-y (four-color system) photometry of FG Vir on 26 nights during observing seasons in 1985 and 1986; the observational strings total 114 hours. The b-y color index varies essentially in phase with y brightness. Although a dominant variation of about 0.08 day period appears in the data (as it did in the previous studies), there is amplitude modulation with an observed range A_y = 0.023 to 0.070 mag (maximum to minimum).

I report results of period and period stability analyses for FG Vir, in the context of Delta Scuti pulsation.

24.10

FK Comae Berenices: Nonthermal Radiation from an Exotic Magnetic Star

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FK Com is an unusual, rapidly rotating (period 2.4 days, $V_{\sin i}$ 120 Km s^{-1}) G star believed to be either an evolved Algol-type system or the result of coalescence of a W UMa binary. FK Com shows starspots, flares, Hα emission of over 1000 Km s^{-1} spectral width, and a slowly varying radio component.

We report VLBI measurement of FK Com in an unusually high (6 mJy) level of radio activity. The radio component was 18 D_* in size (D_* = 9 $D_\odot$, d = 250 pc).

Brightness temperature (1 x 10^8K) and radio luminosity were generally similar to those observed from Weak-wind T Tauri stars (WTTS) in moderate levels of radio activity, or from the young magnetic star S1 in the ρOphiuchi star-formation region. WTT stars resemble FK Com in chromospheric activity, rotation, x-ray emission, and nonthermal radio properties.

A new hypothesis - that FK Com is not a rare, evolved star but a young (10^6y), "runaway" PMS star outside a recognized star-forming cloud - will be examined in light of observations at all wavelengths.

24.11

Three-Dimensional Models of Planetary Nebulae Using Smooth Particle Hydrodynamics

R. F. Stellingwerf (MRC), R. C. Kirkpatrick (LANL)

A preliminary set of hydrodynamic models of planetary nebulae have been computed in one-, two-, and three-dimensions using the Smooth Particle MHD code SPHC. It is our intention to explore the consequences of various possible mechanisms for generation of the nebula. These include: 1) shell ejection, 2) multiple wind interaction, 3) shell ablation, and 4) the effect of magnetic fields. We assume a fluid approximation in these models, and, at present, very simple physics. The results of the two-dimensional accelerated shell models show filamentary structure formation at the inner edge of the shell in a cylindrically symmetric geometry. In the plausible case of thicker shell mass in the equatorial region, the cool shell shows a multiple ring structure similar to some observed objects. The hot inner material assumes a prolate shape. Three-dimensional models of this type of nebula show complicated filamentary structures that saturate at an early stage of shell acceleration. Additional models should distinguish between the various mechanisms and help identify the primary parameters that differentiate between the various types of observed nebulae.

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24.12

The Shape of Planetary Nebulae

R. C. Kirkpatrick (LANL), R. F. Stellingwerf (MRC)

While most static and dynamic models of planetary nebulae in the past have been spherically symmetric, observations and kinematic models generally reveal axial symmetry, and even helical structure in some cases. Several theories have been advanced to explain the variety of nebular structures, but most attempts have been ballistic in nature. Recently, 2-D hydrodynamic codes have been applied to the problem of nebular shaping, but an underlying ignorance of the progenitor makes any results thus far only suggestive of what may be. While the axial symmetry of most planetary nebulae suggests that the acceleration of the shell is stable long enough to allow the velocity to reach 20-60 Km/s, the presence of various inhomogeneities suggests that some type of instability must occur later on. Any successful theory of the shaping of planetary nebulae must 1) take into account the competing acceleration mechanisms, 2) match the statistics of the observed shapes, and 3) explain the (late) development of inhomogeneities in these objects.

24.13

Spatial Variation of Dust Luminescence in the Planetary Nebula NGC 7027

D.G. Furton and A.N. Witt (U. Toledo).

Recent photometric and spectroscopic observations of many reflection nebulae and several planetary nebulae indicate that a luminescence process, which we attribute to the photoluminescence (PL) of hydrogenated amorphous carbon (HAC) dust, contributes substantially to the spectral energy distribution of these objects between 5500Å and 8500Å. We have obtained longslit CCD spectrophotometric observations of the planetary nebula NGC 7027 using the GoldCam spectrograph on the 2.1m telescope at KPNO in order to study the spatial distribution of the PL in this object. The spectral and spatial resolution of our observations are 10 A/pixel and 0.75 arcsec/pixel, respectively. The PL intensity is derived as a function of position by subtracting a theoretical atomic continuum spectrum from the observed continuum, after dereddening the latter and fitting it line-by-line. The ratio of the PL/atomic continuum intensity increases from about 0.15 near the center to about 0.5 at an approximate distance of 3 arcsec from the center. This indicates that the PL is associated with the neutral shell surrounding the ionized volume of NGC 7027. The PL/continuum profile is very similar to the 3.3μm/Brα profile obtained by Woodward et al. (1989, Ap. J., 342, 860), indicating that 3.3μm emission and HAC PL are cospatial. A similar comparison with the spatial distribution of ν=1-0 S(1) H_2 line emission presented by Beckwith et al. (1980, A.J., 85, 7) indicates that PL emission originates predominantly from a slightly smaller region just inside the H_2 emission shell. We thank the NSF for support throughout this project through grant #AST-8814987 to The University of Toledo.

24.14

The Filaments in Supernova Remnants: Sheets, Strings, Ribbons, Or ?

J.R. Dickel (U. Illinois)

The filaments in old supernova remnants present a wealth of beautiful detail to the beholder. We do not, however, know the detailed three-dimensional structure of these features. They may be portions of sheets seen edge-on, thin string-like components, or intermediate ribbons. Another possible configuration contains portions of small hemispherical shells expanding into different density regions. To explore various possible shapes, I am simulating in the computer a three-dimensional shell containing