

119.12

Extended 60 μm Emission from Nearby Mira Variables

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Circumstellar dust envelopes around some optically visible late-type stars are so extensive that they are detectable as extended at an arc-minute scale by the IRAS survey observations (Stencel, Pesce and Bauer 1988, *Astron. J.* 95, 141; Hawkins 1990, *Astron. Ap.* 229, L8). The width of the IRAS scan profiles at 10% of peak intensity is an indicator of source extension.

Wyatt and Cahn (1983, *Ap. J.* 275, 225) presented a sample of 124 Mira variables in the solar neighborhood. Of this sample, 11 Miras which show silicate emission are bright enough at 60 μm for a significant determination of the width of a scan at 10% of peak flux. Individual scans and maps were examined in order to determine whether any observed extension was associated with the central star. Five stars showed significant extension apparently due to mass loss from the central star: R Leo, o Cet, U Ori, R Cas and R Hor.

IRAS LRS spectra, point source fluxes and observed extensions of these sources are compared to the predictions of model dust shells which assume steady mass loss.

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119.13

Are there Bucky Balls in Circumstellar Space?

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Recently the gas-phase (and solid phase) infrared emission spectrum of C_{60} -buckminsterfullerene has been obtained. Bands attributable to C_{60} have been identified at 8.6 μm (1169 cm^{-1}), 17.5 μm (570 cm^{-1}), 19.0 μm (527 cm^{-1}) and 7.1 μm (1410 cm^{-1}) (Frum et al. 1991, *Chem. Phys. Lett.*, 176, 504).

The low resolution spectrometer (LRS) on IRAS obtained spectra in the 8-22 μm region of brighter sources including about 500 carbon stars. Besides the 11.2 μm SiC dust grain feature, a significant number of the carbon stars show an emission feature between 8-9 μm typically peaking around 8.6 μm even after correcting for a calibration problem associated with the short wavelength end of the spectra (Volk and Cohen 1989, *A.J.*, 98, 1918). The strength of this emission feature relative to the SiC feature varies significantly from being absent to being much stronger than the SiC feature. Attempts to attribute this feature to PAHs have been unsuccessful. We suggest that the 8.6 μm feature may be due to buckminsterfullerene- C_{60} . Attempts to identify the diffuse interstellar bands with C_{60} have been unsuccessful. We are conducting a search for the 17.5 and 19 μm features associated with buckminsterfullerenes. The strength of the 8.6 μm feature will be correlated with other known abundance parameters.

Session 120: Instrumentation, Gamma Rays

120.01

The Performance of Partial Adaptive Correction at the MMT

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Partial correction of atmospheric seeing by adaptive optics can yield significant improvements in image quality. This affects not only direct imaging but also post-detection correction techniques such as short exposure peak tracking and speckle imaging. In this paper we use numerical simulations to investigate the relative merits of wavefront tilt and/or piston correction for the six 1.83 m subapertures of the Multiple Mirror Telescope (MMT) under near-infrared seeing conditions. These simulations are used to predict the performance of a recently installed adaptive mirror at the MMT. Further enhancement in image quality results from the application of peak tracking short exposures. The resulting images are characterized by their Strehl ratios and also by a new parameter which more accurately quantifies the diffraction-limited performance.

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120.02

Using the Hubble Space Telescope: Before and After the Servicing Mission

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As the Hubble Space Telescope (HST) project nears its anxiously-awaited Space Shuttle servicing mission (tentatively set for late 1993 or early 1994), the Space Telescope Science Institute (STScI) is simultaneously preparing for the last observing cycle before the mission (Cycle 3), a call for additional archival proposals, and the observing cycle that will commence following the servicing mission (Cycle 4). We anticipate a great deal of interest in Cycle 4 from the astronomical community since this will be the first chance for astronomers to compete for time on HST with its original design capabilities fully restored. This poster paper outlines the details of these upcoming opportunities, and describes the technical support available from the User Support Branch at STScI (and in Phoenix -- for one week in January only!).

The Principal Investigators of approved Cycle 3 observing proposals will be notified shortly before the AAS convenes in Phoenix. At the meeting, we'll have computers and network connections set up at the STScI display booth so we can work with any new HST General Observers and/or their co-investigators to begin constructing their Phase II observing programs. Since Cycle 3 could be as short as 6 months (depending on the fluctuations of the Space Shuttle schedule), submitting a sound Phase II program early is the best way to increase the chances that we will be able to execute the program before the HST servicing mission closes out the observing cycle. Approved Cycle 3 General Observers are invited to take advantage of this opportunity to get help jumpstarting their programs between talks in Phoenix.

120.03

Focus History of the Hubble Space Telescope

Hashima Hasan (STScI), C.J. Burrows (STScI/ESA) and D. Schroeder (Beloit College)

Since the launch of the Hubble Space Telescope (HST) the secondary mirror of the telescope has been moved several times in order to collimate the telescope and also define a position of best focus of the aberrated beam. In addition to these moves the focus position changes over time because of water desorption by the graphite epoxy in the metering truss. We report here the focus history of the telescope based on a knowledge of the mirror moves made and an analysis of the desorption monitoring data obtained by the Faint Object Camera (FOC) in the F/96 mode and also of the routine calibration data obtained by the Wide Field and Planetary Cameras. Focus values were extracted using two different methods. In the first method the distance between the center of the Point Spread Function (PSF) and the images of the pads supporting the HST primary mirror are related by an analytical formula to a shift of the secondary mirror from its position at paraxial focus, which can be translated to a focus error. In the second method an analytical formula for the PSF with variable aberration coefficients is fitted to the data and aberrations extracted. Both methods show good agreement.

The data shows that a desorption of about 75 microns has taken place since Aug. 16, 1990. The desorption has clearly not levelled off as expected from the trend of the earlier data and is being studied to understand it better. Another interesting phenomenon noted in the FOC images is "breathing" of the order of 2 - 4 microns. The cause for this is under investigation.

120.04

Attitude Determination and Target Location with the Hubble Space Telescope

M.D. Lallo, C.R. Cox (ST ScI)

In this paper we present a method to determine the precise attitude of the Hubble Space Telescope. We describe the procedure, in which we take the HST's engineering trace of two guide stars and, by using accurate celestial coordinates for these stars, and accounting for instrument and field scales, rotations, distortions and velocity aberration, produce a transformation from HST's internal coordinate system to celestial coordinates. We discuss how this pointing knowledge is used to locate or map the scientific instruments' apertures in the internal space, to determine where a star should have been seen, and to find where, on a planet surface for example, a particular small aperture was pointed. We conclude by discussing the importance of the accuracy of this procedure in recalculating the aperture positions following the introduction of the corrective optics in the upcoming HST servicing mission.