International Ultraviolet Explorer (IUE) the brightness of the comet increased by a factor of three over 24 hours as measured by the Fine Error Sensor (FES) used to acquire and track the comet. The sensor has half-power bandpass points at 3800 and 6500 Å, a bandpass that is sensitive to CN and C_2 emissions and scattered light from dust. The brightness and production rates of OH and CS emissions and the reflected continuum are calculated from spectra measured during this outburst. The OH brightness varies in phase with the outburst as measured with the FES as does the reflected component of the dust. Preliminary analysis of the CS emission indicates that it, too, varies in phase with the outburst.

20.12

A Comparison of IUE observations of CS emission in Comets Halley and Giacobini-Zinner

William M. Jackson, Chemistry Department, University of California, Davis Ca. 95616, and Paul S. Butterworth, National Space Sciences Data Center, Goddard Space Flight Center, Greenbelt, Md. 20771.

IUE observations of comets Giacobini-Zinner and Halley were made with the long wavelength camera in both the high resolution and low resolution modes. The low resolution data has been used to determine the production rate of CS for both comets as a function of heliocentric distance. It has also been used to derive vibrational band ratios. The high resolution data was analyzed with a spectral simulation program and with an inversion program. The former program assumes a Boltzmann distribution while the latter program recovers the original distribution with parameters that determine how well the data has been fit.

Session 21
Asteroids
(A. Barucci and A. Harris, Moderators)
11:00–12:40, Room 64
(in parallel with Session 20)

21.01

A Search for Weak Absorption Features in CCD Reflectance Spectra of Primitive Asteroids

F. Vilas (NASA/JSC), M. J. Gaffey (RPI), L. A. McFadden (U. Maryland), T. V. V. King (USGS/Denver)

Weak absorption features near 0.7 microns due to the presence of iron oxides in phyllosilicates have been identified in terrestrial serpentines and chlorites (King, PhD Thesis, 1986) and carbonaceous chondritic material (Gaffey, personal communication). Reflectance spectra acquired using a CCD spectrograph of C-, P-, D-, and F-class asteroids (generally considered to be primitive solar system material) are being examined for the presence of these absorption features. For this study, these spectra were chosen from reflectance spectra of 40 asteroids based upon criteria which included good spectral signal-to-noise and photometric observing conditions. Median filtering and FFT enhancement techniques are being conducted in order to reduce noise and define any existing features. Possible sources of spurious features, including variations among solar analog standard stars and temporal changes in ozone absorption, are being simulated to determine if they could cause absorption features. Preliminary examination indicates that some weak features exist among these spectra, especially those of main-belt primitive asteroids. Results of the more extensive study will be presented.

21.02

Photometry of Large Rapidly Rotating Main-Belt Asteroids

C.R. Chapman, D.R. Davis, S.J. Weidenschilling, R. Marcialis, R. Greenberg, D. Levy, and S. Vail (Planetary Science Institute, Tucson, AZ)

We have performed final reduction and preliminary interpretation of 259 complete or partial lightcurves obtained for 20 large, rapidly rotating main-belt asteroids and 6 controls. We present sequences of lightcurves at a wide variety of phase angles and ecliptic aspect angles, which greatly expand the available literature of these unusual objects. In many cases, we have observed considerably larger or smaller amplitudes than previously reported. For example, an 0.13 mag. amplitude observed for 216 Kleopatra indicates a nearly "pole-on" perspective for this exceptional body at orbital longitude 67°. 125 Liberatrix, we have found, can reach 0.64 mag. amplitude. We have also observed distinctly unusual lightcurve shapes, in comparison with previous data (e.g. for 41 Daphne). We have obtained preliminary phase relations for these oddly-shaped bodies that are typical for the phase relations measured for more spherical bodies of the same type. Our data on 511 Davida approximately doubles the available photometric database; our data have been used by Drummond to demonstrate consistency with published pole solutions. Data are presented for both well-studied asteroids of interest, such as 16 Psyche, 22 Kalliope, 39 Laetitia, and 201 Penelope, as well as some rapid-rotators rarely or never observed before, such as 107 Camilla (a Cybele) and 584 Semiramis.

21.03

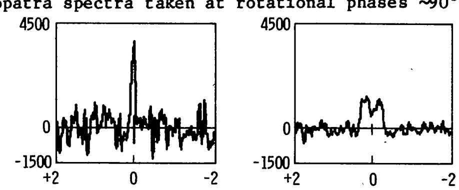
Radar Detection of 12 Asteroids from Arecibo

S. J. Ostro (JPL/Caltech), D. B. Campbell (NAIC), and I. I. Shapiro (Center for Astrophysics)

We detected echoes from the following asteroids with the Arecibo Observatory's λ13-cm radar between 10/85 and 7/86:

18 Melpomene	84 Klio	230 Athamantis	1866 Sisyphus
21 Lutetia	192 Nausikaa	393 Lampetia	3103 1982 BB
33 Polyhymnia	216 Kleopatra	1036 Ganymed	1986 DA

The 1986 DA detection is the first of an asteroid during its discovery apparition. The radar sample now includes 28 mainbelt and 16 near-Earth objects. As an example of how our results constrain physical properties, consider these Kleopatra spectra taken at rotational phases ~90° apart:



Echo power, in km^2 of radar cross section per 75-Hz frequency resolution cell, is plotted vs. Doppler frequency (kHz). The bar at (0,0) shows ±1 standard deviation of the noise. Our preliminary, largely subjective bandwidth estimates (290±70, 660±70 Hz) indicate that the convex envelope of Kleopatra's polar silhouette has extreme breadths in a ratio: DMAX/DMIN = 2.3 (+0.8, -0.5). Further, DMIN = 57±15 km/sin A and DMAX = 129±15 km/sin A, where A is the angle between the line of sight and the asteroid's pole on 11/29/85. Our values A = 28°±5°, DMIN = 120±30 km, and DMAX = 270±30 km are consistent with available stellar occultation results and pole-direction estimates. The wider spectrum's bifurcation is unique among mainbelt asteroid spectra and supports the conjecture (Weidenschilling, 1980, Icarus 44, 807, and refs. therein) that Kleopatra is a "dumbbell-shaped" asteroid.

21.04

Rotation Properties of Trojan Asteroids

L. M. French*, D. M. Kramer (MIT), H. Vargas S. (CTIO)

Because the Trojan asteroids are located in the L4 and L5 Lagrangian points of Jupiter, their collisional