Analysis of Callisto's phase curve as derived from telescopic observations and Voyager images. **D. D. Domingue (Lunar and Planetary Institute), G. W. Lockwood, D. T. Thompson (Lowell Observatory)**

Observations taken by two of us (G. W. L. and D. T. T.) have measured the variations in brightness of both Callisto's leading and trailing hemispheres at small phase angles in two wavelengths (0.55 and 0.47 μm). From this data set updated rotational phase curves have been derived and compared to past observations by Morrison *et al.* (**Icarus**, **23**, 399-416,1974), Blanco and Catalano (**Astron. & Astrophys.**, **33**, 105-111,1974), and Millis and Thompson (**Icarus**, **26**, 408-419,1975). Combining this data with disk-integrated measurements taken from the Voyager 1 and 2 images of Callisto enabled us to construct a solar phase curve with a large range in phase angle. Data from images taken in the clear and blue filters were combined with the 0.47 μm telescopic data, and data taken from images in the green and orange filters were combined with the 0.55 μm telescopic data. These data were modeled using Hapke's photometric theory. Preliminary results show

that the regolith of both hemispheres has a porosity between 74 and 80 percent, compared to the lunar regolith which has a porosity of about 60 percent. This porosity is intermediate between that of our own moon and Europa, which has a porosity of about 96%. It is deduced, therefore, that comminution processes (such as meteoritic bombardment) have played a larger role in the formation of Callisto's regolith than on that of Europa. This supports what is seen in the higher resolution Voyager images. The analysis also shows that both hemispheres are rough, where the average surface tilt for the trailing hemisphere is ~25°, and the leading hemisphere is about 10 degrees rougher. However the leading hemisphere data only extends out to about 50 degrees. Verification of these values of macroscopic roughness need to be made by an analysis of the Voyager disk-resolved data. The single particle scattering properties were modeled by a double-lobed Henyey-Greenstein function. Both hemispheres were found to be moderately backscattering with little to no forward scattering.