10.02

The Coma and Light Curve of Chiron

K. J. Meech (Institute For Astronomy, Univ. Hawaii); M. W. Buie (Lowell Observatory); B. E. A. Mueller and M. J. S. Belton (KPNO)

In support of our HST observations of Chiron obtained during 1993 February and March, we have obtained extensive ground-based broadband (BVRI) CCD data on this object. Thirty-six hours of data were obtained on 15 nights of observation between UT 1993 January 24 and 1993 March 31 using the UH 2.2m telescope on Mauna Kea (MKO), the Lowell Observatory 42-inch and 72-inch telescopes, and the KPNO 2.2 m telescope. Chiron was at heliocentric distances between 9.35–9.25 AU and geocentric distances between 8.35–8.63 AU during the observations. The purpose of the MKO dataset was to ascertain the extent and color of the dust coma and the KPNO and Lowell data were for further refinement of the rotation period. The extended coma during January and February appeared to be less prominent than during January 1992, however, the rotational light curve was not detectable, indicating a larger amount of material in the coma near the nucleus. The extent of the coma and the total brightness behavior of Chiron from this observing season in combination with the 35 nights of data from Meech & Buie (in prep.) from 12/88–03/92 will be discussed in the context of the model of the bound dust atmosphere.

10.03

Dynamics of the Kuiper Belt

M.J. Holman, J. Wisdom (MIT)

In a study of the dynamics of small bodies in the Kuiper belt, 1500 test particles were placed in orbits in the Kuiper belt and evolved for 200 million years using the symplectic mapping method of Wisdom and Holman (1991). The four giant planets were included in the integration as perturbers. Numerous test particles with semimajor axes between 30 AU (Neptune) and 43 AU encountered Neptune during the course of the integration. Test particles that encounter Neptune late in the integration generally reach Neptune by a path that roughly preserves semimajor axis, similar to the delivery of meteorites from mean-motion resonances in the asteroid belt to Earth and Mars crossing orbits. The resulting distribution of encounter times suggests that the times of first encounter with Neptune can reach several billion years. Futhermore, the flux of new encounters decays slowly, roughly as the inverse of time. This gives new insight into the dynamics of the delivery of short period comets from the Kuiper belt and permits a rough estimate of the mass of the Kuiper belt of 0.1 Earth masses. We compare results with the preliminary orbits of recently discovered Kuiper belt objects.

10.04

Deep CCD Imaging and Photometry of 2060 Chiron during the 1992–1993 Apparition

R. L. Marcialis (Pima Community College) and S. M. Larson (LPL/U. Arizona)

Approximately 300 CCD images of 2060 Chiron were obtained with the Steward Observatory 2.3-m telescope and Larson IHW CCD camera during November and December of 1992, and on part of one night in January of 1993. The effective focal ratio of the system was $f/1.9$, which allowed properly exposed frames to be read out less than 2 minutes apart. Most of the images were in the Cousins R passband, and were obtained with the goal of exploring the high-frequency (~10 min) "dropouts" in Chiron's rotational lightcurve (Marcialis and Buratti 1993, *Icarus*, in press), and to use these dropouts to determine whether the object rotates in a prograde or retrograde manner.

The November observations were made within about two weeks of Chiron's pre-opposition stationary point, at a solar phase angle of nearly 6°. Co-addition of these images show a well-developed tail at least 50″ long at position angle 288°. Assuming the tail to be pointed in the anti-sunward direction gives it a length of at least 16.6 million km (0.11 AU).

Photometric reductions of the observations are in progress, and results will be presented at the meeting.

10.05

Long Slit CCD Observations of Comet Schaumasse (1992x)

A. L. Cochran (U. Texas)

We obtained long slit CCD spectroscopic observations of comet Schaumasse during 1992 and 1993 in order to study the distribution of the gas in the coma. Table I is a log of the observations:

Table I: Observing Log

UT Date	R_h (AU)	$\dot{R}_h$ (km sec^{-1})	Δ (AU)	He 10830Å EW (mÅ)
27 Dec 92	1.48	-12.2	0.57	63
26 Mar 93	1.24	5.3	0.59	56
28 Mar 93	1.24	5.7	0.60	57
30 Mar 93	1.25	5.9	0.60	59

All observations were obtained on the 2.7 m telescope of McDonald Observatory at a resolution of 7Å with a spectral range from 3000–5600Å. With this spectral range, we can observe emissions due to OH, NH, CN, C_3, CH, C_2, and CO^+. In this paper, we will discuss the distribution of the gas in the coma. The gas showed a slight asymmetry in the sunward/tailward sense but was resonably symmetric perpendicular to the sun/tail line. We will concentrate on the distribution of the OH gas. With these observations we will derive the H_2O lifetime against photodissociation in a manner analagous to Cochran and Schleicher (*Icarus*, in press, 1993). These observations are particularly complementary to that study since they were obtained at moderately low solar activity, as evidenced by the He 10830Å EW (solar minimum is defined as EW=48 mÅ; solar maximum=75 mÅ). These are the first long slit observations we have obtained with EW< 63 mÅ. With these data, we intend to continue our study of the trend of H_2O lifetime with solar activity.

10.06

The Fragmentation of Comet Wilson (1986l)

G. P. Knopp and K. J. Meech (Univ. of Hawaii)

Comet Wilson (1986l) was observed on 23 nights from October 1986 to November 1989 at the UH 2.2m telescope on Mauna Kea (MKO), the KPNO 2.1m and 4m telescopes and the CTIO 1.5m and 0.9m telescopes. During the observations, which bracket perihelion, Comet Wilson was at heliocentric distances of 1.2–7.8 AU. Broadband imaging photometry was obtained (BVR), which was more extensive after the nucleus' splitting was observed in February 1988. This has allowed examination of the photometric and dynamical behavior of the fragment and parent body. The photometry demonstrates that both objects were fairly constant in their behavior, with highly isotropic comae. However, the fragment's coma does cease to be centrally condensed in November 1989, implying the suspension of detectable activity. The relative trajectories of the nuclei allow an estimation of the time of splitting and may show the presence of non-gravitational forces. The general photometric behavior will be discussed, as well as surface brightness profiles, in relation to the physical characterisitics of the fragment and parent bodies.

10.07

A Multi-Wavelength Study of the Potentially Meteorite-Producing Comet P/Wilson-Harrington (4015 1979VA)

H. Campins, D. Osip, B.Å.S. Gustafson (U. of Florida), G. Rieke, M. Rieke, S. Larson (U. of Arizona), and D. Schleicher (Lowell Observatory)

The identification of object 4015, 1979 VA, as Comet P/Wilson-Harrington, P/W-H, (IAUC 5585, 1992) supports the notion that extinct or dormant nuclei of periodic comets can have asteroidal appearance, and that some fraction of the Earth-crossing asteroids have a cometary origin. Furthermore, orbital characteristics make P/W-H particularly interesting even among the comet-asteroid transition objects. It has a