08.25-P

Comet Austin (1989c$_1$) : Analysis of Narrowband Photometry.

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Due to its large excursions from southern to northern skies and back again, narrowband filter photometry of Comet Austin (1989c$_1$) was obtained by utilizing telescopes at both Perth Observatory and Lowell Observatory. Observations of Comet Austin began on Dec. 19, 1989 at a heliocentric distance (r_H) of 2.25 AU and the comet was followed to inside of 0.8 AU on Mar. 16, 1990. Post-perihelion observations resumed just over one month later and continued through the end of June covering an r_H range from 0.57–1.72 AU. CN, C_2, and C_3 abundances as well as Afρ values, were measured on all nights from both Perth and Lowell, while OH and NH measurements were obtained from Lowell when possible. The comet displays a significant pre-/post-perihelion asymmetry in all species with pre-perihelion production rates higher in all cases. Also, the slope of the r_H dependance appears flatter before perihelion than after for all species. Details of these results will be presented, along with further peculiarities in the heliocentric distance dependance of the Afρ and OH abundances. In addition, the molecular abundance ratios in this comet will be compared with results for normal comets (Osip *et al* 1991). Finally, we shall discuss how other published data of Comet Austin fit in with our findings. This research was supported by NASA grant NAGW–2366 and NSF grant AST–8718071.

08.26-P

Prospects for Observing Sulfur-bearing Cometary Molecules at Infrared Wavelengths

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The number of sulfur-bearing molecules now detected (H_2S, CS, S_2) or limited by observations (H_2CS, OCS, SO, SO_2) has increased in the past few years. High-resolution infrared instruments capable of detecting molecular emissions are becoming available (CGS-4, CSHELL, IRSHELL, etc.). We therefore evaluate the prospects for observing sulfur-bearing molecules with these instruments. For those molecules which should be observable, we evaluate combinations of observing parameters (e.g., Sun-comet distance) and instrument settings (e.g., aperture size).

08.27-P

Fabry-Perot Observations of [OI]6300 Emission from Comet Austin (1989c1).

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We undertook a program to observe Comet Austin (1989c1) from 16 April to 4 May and from 11 May to 26 May 1990 using the West Auxiliary of the McMath Solar Telescope on Kitt Peak, Arizona. The field of view (FOV) on the sky was 10'.5 in diameter. The observations were made with a 15cm dual-etalon Fabry-Perot spectrometer with a velocity resolution of 10 km sec^{-1} (0.21Å), which was sufficient to resolve cometary [OI]6300 emission from nearby NH_2 and telluric [OI]6300 emissions. Both scanning and imaging data were obtained.

We will present: (1) images of [OI]6300 emission within our FOV, (2) a Haser model of the distribution of [OI]6300 emission (3) [OI]6300 intensities within our FOV, and (4) post-perihelion production rates for O(^{1}D) and H_2O as a function of heliocentric distance.

08.28-P

How Dirty are Comet Nuclei?

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A study of cometary dust trails suggests that short-period comets lose most of their mass in large refractory particles. A comparison of refractory to volatile mass loss rates indicates that comet nuclei may have an average refractory to volatile mass ratio of ~ 3, well above canonical values of between 0.1 and 1.0, and consistent with the upper limit estimated for P/Halley by the Giotto spacecraft (1). Such a comet would be ~ 75% refractory by mass and ~ 50% by volume. This also is consistent with an outer solar system formation location for short-period comets, comparing closely with refractory to volatile mass ratios inferred from the densities of Pluto and Triton which would have been accumulated from these bodies.

(1) McDonnell, J.A.M., P. Lamy, and G.S Pankiewicz 1991. In *Comets in the Post-Halley Era*, R. Newburn *etal.*, ed. (Kluwer, Dordrecht), pp. 1043-1073.

08.29-P

The "Little Bang" as the Origin of Comets

T. Van Flandern (Meta Research)

The conventional theories of comet origin from the primeval solar nebula and the dirty snowball nature of comets both suffer from a failure to anticipate most of the important properties of comets, which have been explainable only with the help of ad hoc hypotheses. Examples of features not anticipated by the model but explained with separate hypotheses are: the assembly of new comets into an "Oort cloud"; the asymmetric distributions of perihelion directions; the absence of hyperbolic comets; large brightness losses for new comets, but not old ones; spectroscopic and albedo similarities to minor planets; activity originating in the coma; splitting; and split fragment velocities. By contrast, the hypothesis of cometary origin in the relatively recent breakup of a planet in the asteroid belt predicts and requires essentially all observed properties of comets in an a priori manner, without the need of any supplementary hypotheses. The Oort cloud illusion is caused by the debris rainback effect from any explosion. The angular momentum of the source planet requires the asymmetries in perihelion directions and distances. Hyperbolic comets are unlikely. Comets must all have trapped debris gravitationally bound in orbit around their primary nuclei. On first approach to the Sun, debris must gravitationally escape the coma, which cannot happen on subsequent revolutions unless the perihelion distance changes. The similarities between comets and minor planets are implied by their common source, with low albedos for both due to explosion blackening. Activity originating in the coma where debris is also indicated. Splits are simply gravitational escapes of orbiting debris, requiring no added energy. The velocities of splits must depend upon solar distance to the minus one-half power, just as observed! The uncontrived predictive power of this model makes a compelling argument for its superiority to the conventional paradigm.