CHIRON: EVIDENCE FOR HISTORIC COMETARY ACTIVITY

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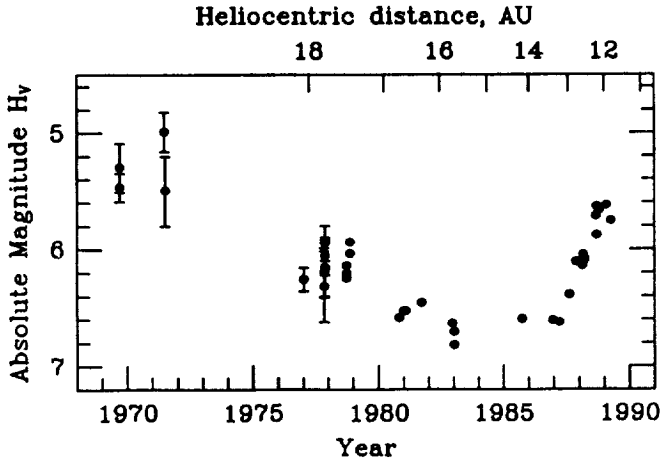
The non–asteroidal brightening of (2060) Chiron, first noted by Tholen in 1988 (*IAUC* 4554), is now ascribed to cometary activity. Photometry since 1988 has revealed a broad surge in brightness that peaked in 1989 about 1.0 mag above the brightness in the mid–1980s. The surge is evidently due to the sporadic formation of a dust coma, which is itself driven by the presence of extremely volatile ices at or near the surface. We note that CN emission has recently been reported (Bus *et al., Science* **251**, 774–777, 1991; see also Cochran and Cochran, *Icarus* **90**, 172–175, 1991). Since Chiron is now nearing perihelion (at 8.5 AU heliocentric distance), there is interest in determining whether it has exhibited anomalous brightening in the past, particularly at greater heliocentric distances. It should thereby be possible to refine our understanding of the surface processes occurring on Chiron and the mechanisms generating comatic activity.

Photographic plates dating back to 1895 are known to contain images of Chiron. Using some of this archival material, we present the initial results of a project to determine Chiron's brightness history over orbital timescales. Because of excessive trailing and poor quality of the emulsions, some of the oldest plates are amenable only to rough photographic photometry, but they may still be valuable in placing useful limits on Chiron's historical cometary activity. We have so far examined a particularly homogeneous and high–quality set of plates taken prior to and around the time of Chiron's discovery in October 1977 at the 1.2–m Oschin Schmidt telescope at Palomar Mountain Observatory. Images of Chiron have been identified and digitized using a PDS microdensitometer, and images of field stars around Chiron have been both similarly digitized and photometrically calibrated using recently acquired B– and V–band CCD frames. Plotted below is the V–band absolute magnitude H_V of Chiron versus date and heliocentric distance. Points shown between 1978 and 1989 are from the tabulation by Hartmann *et al.* (*Icarus* **83**, 1–15, 1990). As a result of the present work, eleven new data, including estimated errors, have been added between 1969 and 1977. They indicate Chiron to have been as bright or brighter in the early 1970s—at a heliocentric distance of 18.9 AU and very close to aphelion—than during the current outburst. The implication that Chiron can be active at any heliocentric distance in its present orbit suggests that the active volatile is either N_2, CH_4 or CO, and that a substantial degree of mantling may have developed (cf. Stern, *Publ. Astron. Soc. Pacific* **101**, 126–132, 1989). We will present further historical data, discuss the error bars, and suggest possible mechanisms for the observed activity.



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