

COMETS DISCOVERED BY PCAS IN 1989; E. F. Helin, B. P. Roman, and J.T. Alu, Jet Propulsion Laboratory, Pasadena, Ca 91109

Twenty new comets were discovered worldwide in 1989. Of these 5 were discovered in the course of the Palomar Planet-Crossing Asteroid Survey (PCAS). In addition, P/Brorsen-Metcalf, last seen in 1919, was recovered by PCAS after many months of searching by astronomers around the world (1).

Of the 5 comets discovered by PCAS, 3 are periodic, Jupiter family comets representing half of a total of 6 periodic comets found worldwide in 1989.

PCAS COMETS

	a	e	i	q	Q	P, yr
P/1989 b	4.04	0.14	4.24	3.47	4.61	8.12
1989 s			128.14	1.32		
1989 v			46.04	1.05		
P/1989 w	4.49	0.17	9.76	3.71	5.26	9.50
P/1989 y	4.10	0.53	7.51	1.94	6.26	8.31

P/Comet Helin-Roman-Crockett, 1989b, was discovered January 3, 1989. Because it is a distant short period comet of low inclination it could be observed for an extended time. Its orbit is strikingly similar to P/Oterma and P/Gehrels 3. Its close approach to Jupiter (in 1983) was probably responsible for moving it into its current orbit (2, 3). These comets appear to be in chaotic orbits of great unpredictability.

Comet Helin-Roman, 1989s, a parabolic comet was discovered September 5, 1989. It was moving 2.2 degrees per day, a rapid motion for a comet (relative to the Earth). In fact, this is the fastest apparent motion of a comet since Comet IRAS-Araki-Alcock in 1983.

Comet Helin-Roman-Alu, 1989v, another parabolic comet was discovered October 1, 1989 at magnitude 13 and was moving 1.4 degrees per day. It has been observed for over two months, reaching magnitude 10, with observations still being reported.

P/Comet Helin-Roman-Alu 1, 1989w, was discovered on October 2, 1989, as a faint, slow moving object. From discovery apparition observations, PCAS identified observations from August, 1988 which with observations through December 1989 makes a long arc of 14 months. With this long duration of observations, it is possible to model the motion of the comet, taking into account the gravitational perturbations of all the planets in computing future apparitions. D. Yeomans has integrated this orbit forward

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and found that it will return in 1997 at a perihelion distance of 3.7 A.U., yet the following apparition, in 2005, will find its perihelion distance significantly changed to 3.0 A.U. This change follows a moderately close approach to Jupiter in 2001. (4)

P/Comet Helin-Roman-Alu 2, 1989y, was discovered on October 26, 1989. Like 1989w it showed only subtle motion at magnitude 16. It has been observed through December, 1989.

P/1989w and P/1989y cross the orbit of Jupiter, subjecting them to strong perturbations, leading to rapid evolution of their orbits. Both comets are in resonance with Jupiter: P/1989w is in a 5/4 resonance, and P/1989y appears to be in a 10/7 resonance based upon the first months observations. These high order resonances will have little affect on the stability of the orbits.

Interestingly, PCAS comets 1989s, 1989v, 1989w, and 1989y were discovered in a period of about seven weeks (5) which is a notable number of comet discoveries in such a short time.

The three periodic comets have all had close approaches to Jupiter in recent years (6) suggesting that they are old comets which have evolved into new, short period comets. As such, they are objects of relatively "short" lifetimes in the inner Solar System.

References:

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