

PHYSICAL DYNAMICS OF THE UPSILON PEGASID FIREBALL – EUROPEAN NETWORK 190882A H. Povenmire Florida Institute of Technology
215 Osage Drive Indian Harbour Beach, FL 32937.

On August 8, 1975, numerous faint, yellow-white meteors were observed radiating from the Square of Pegasus. The radiant was near the star, Upsilon Pegasi, at R.A. 350°, Dec. + 19°. On August 7, 8, and 9, 1978, the rates of the Upsilon Pegasids reached approximately 20 per hour. The broad maximum seems to occur in clumps. That is, several will occur in a short period of time and then a significant lull will occur with no activity [1].

On August 19, 1982 at 2:09:57 U.T., a magnitude –14.76 Upsilon Pegasid fireball occurred over the European Network and was recorded by six of their cameras. The orbital elements are as follows (2000.0) [2]:

$$\omega = 305.9041^\circ$$

$$i = 85.076^\circ$$

$$\Omega = 146.0412^\circ$$

$$q = 0.2022 \text{ A.U.}$$

$$e = 1.0179$$

$$\text{preatmospheric velocity} = 51.7672 \text{ km/sec}$$

If this meteoroid had not contacted the Earth it would have reached perihelion on approximately September 22 [3].

This type IIIB fireball had a double terminal burst with a duration of .71 second with a 2.0 second persistent train. This fireball was also observed visually and had a yellow-green color. Upsilon Pegasid meteors are snow-like, very fragile and have a specific gravity of approximately 0.27 g cm³. They are similar to the Draconids and the great Sumava Fireball and are thought to come from the outer portions of the comet nucleus. Upsilon Pegasid meteors cannot produce sonic phenomena or meteorites (4).

The mass of the meteoroid which produced this fireball was approximately 11.3 kg and would have had a spherical diameter of 43.2 cm. This meteoroid first became visible at 105.7 km, reached maximum light at 74.7 km and ablated completely at an altitude of 68.6 km. One probable Upsilon Pegasid spectra has been obtained and while blended, is thought to be of Millman Type X which is sodium rich. A literature search has found a total of five other double station Upsilon Pegasids which were originally reported as sporadics. All known comet orbits have been examined and the parent comet of this meteor shower is unknown [4]. The radiant point on the celestial sphere of the parent comet is approximately R.A. 321°, Dec. +34 47' (2000.0).

Using the Impact 4A software program, the computed kinetic energy would be equivalent to 3.64 tons of TNT or 11.3 trillion foot pounds [5].

The period of this highly eccentric comet orbit is unknown but Cephela has estimated that its minimum orbital period is greater than 4700 years [2].

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I wish to acknowledge the generous technical data and assistance given by Z. Ceplecha and P. Spurny of the European Network, Ondrejov Observatory, Czech Republic and the Impact 4A software written by Brad Downs.

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