

Deep Impacting The Comet - 103P/Hartley 2 On Nov 4, 2010

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Comets are serendipitous celestial visitors. There are numerous ancient records of the occurrence in sky of the fuzzy tailed objects and legends that relate these to fall of empires, and disasters and epidemics on the Earth. It was Edmond Halley who first successfully used Newton's gravitation laws in the 18th Century to show that the fascinating celestial objects are actually members of the Solar System. In a year about 20-25 comets may be seen, some new while others en-core. Periodic comets follow highly elliptical

orbits while others the parabolic ones, even hyperbolic. There are supposed to be billions of comets as members of the Solar System.

Far away from the Sun, a comet is just a tiny irregularly shaped body, its nucleus alone that is barely a few kilometres in dimensions and rotating about some axis. It

is composed of rocky material and icy mixture of water, carbon dioxide, ammonia and methane, sulfur, silicate minerals and complex organic compounds etc. As the tiny form approaches the Sun water-ice in the heated surface starts to sublimate. This also loosens up the dirty parts of

the nucleus, the meteoroids. The gas and



dust create a head (coma, about 10,000 - 1,00,000 km) and a tail, directed away from the Sun. The tail increases in extent as the comet approaches the Sun that can get millions of kilometres long, and vice versa. Spectroscopic studies of comets from ground based astronomical observa-

tories, as also a number of fly-by space mis-

sions to comets, have revealed the nature and composition of the comets and their tails in an unprecedented detail. The studies of comets are important for in them lie the clues to the past and present of the Solar System and even to origin of life on the Earth.

The Impactor probe of NASA's Deep

Impact

launched in Jan 2005 impacted the Comet 9P/Tempel 1 on Jul 4, 2005, at about 10 km/sec and made a crater flinging debris, for a large number of images to be taken. But it also created a huge, bright but an obscuring dust cloud. The event was witnessed by

the Deep Impact Spacecraft, spaceborne laboratories and observatories on the ground and created a wealth of data. The impact ejected material that was finer than expected - more of dust than ice and more akin to talcum powder than sand. Among the other substances revealed

Mission

were organic molecules and carbonates, clays and crystalline silicates, substances that normally need liquid water to form. According to NASA, the Mission team found evidence of the presence of water ice on the surface. The Deep Impact Mission has been extended as EPOXI Mission that is now on its way to a rendezvous with the comet 103P/Hartley 2, on Nov 4, 2010. The comet was discovered on March 15, 1986 by Malcolm Hartley with the 1.2m UK Schmidt telescope at Siding Spring, Australia. It is classified as a Jupiter-family comet, period being 6.46 yrs. The closest the comet gets to the Sun is 1.044 (Continued On Page 2)

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Deep Impact.....

AU (perihelion) and the farthest 5.861 AU (1 AU=149.59787 million km - the mean distance of the Earth from the Sun) that is a little beyond the mean distance of Jupiter from the Sun. It has a small, about a kilometre wide, but an active nucleus. Its last perihelion passage took place on May-17.8047, 2004. After its last fly-by the Earth on Jun 27, 2010, the Deep Impact spacecraft proceeded on its course. The spacecraft has two telescopes with digital cameras and an infrared spectrometer. The planned fly-by is to be 700 km from the nucleus. The Deep Impact has already begun imaging the comet, since Sept 5.

Comet Hartley 2 is expected to become a naked-eye object in October, and probably so in early November. It is expected to reach a peak magnitude +5, in the latter half of October and stay as bright for some time. That means, when brightest, it would shine like the Milky Way in a dark sky, and is destined to become the brightest comet of the year. On Sept 10, it hit magnitude + 9 and is brightening up fast, at 0.1 mag per day. In a picture here of Sept 15 taken by Michael Jager, you can well see the comet with a greenish glow. It would be in near opposition on Oct 1, rising as the Sun sets, and then progressively later. By this time it should be at 6th magnitude. The comet is to pass closest by the

Earth on Oct 20.8 from 0.121 AU when it would be seen a few degrees south of the bright star Capella in the constellation of Auriga, and its perihelion on Oct 28.496, 2010 when it would be seen in Gemini. The twelve days after the New Moon (Oct 8) are therefore promising. You will need a good binocular or a small telescope, 50-80 mm in aperture, to view it while the sky needs to be dark enough. On Oct 8 and the following night find the comet passing within one degree of the delightful double star cluster of Perseus. As the days pass, the Moon begins to get brighter and also close to the comet. However, the night of 20/21 October is not a wash-out. The comet shall rise in the east around 22:00 IST on Oct 20 with a bright gibbous Moon around to disappoint a little. The Moon sets early in the morning of Oct 21 (04 34 IST Bangalore; 04 39 Delhi) and so offers about an hour of dark sky to view the comet still high up. The following ten days are spoilt by the moonlight and the comet too begins to fade. From the 30th Oct, one will need to watch the comet with a small telescope when it rises in the east, before a waning Moon does. Make another rendezvous with the comet on the night of Nov 4, 2010 when it shall be between the bright stars Procyon and Betelgeuse, about 7° west of the former at an estimated brightness of 8.4 mag. while the Deep Impact flies pretty close by its nucleus.