En route to a comet, European probe Rosetta to fly by asteroid

July 7 2010, by Richard Ingham

Artist view of ESA's Rosetta cometary probe. The spacecraft is covered with dark thermal insulation in order to keep its warmth while venturing into the coldness of the outer Solar System, beyond Mars orbit. Selected in November 1993 as a cornerstone mission of ESA's long-term science programme, the Rosetta probe was launched by an Ariane 5 on 2 March 2004, on an 11-year journey to the comet 67P/Churyumov-Gerasimenko.

A billion-euro (1.25-billion-dollar) European spacecraft will get up close and personal with an asteroid this Saturday as the probe blasts through the Solar System on its way to rendezvous with a comet.

The flyby comes halfway in the extraordinary tale of the European Space Agency's Rosetta, launched in 2004 on a 12-year, 7.1-billion-kilometre (4.4-billion-mile) mission.

One of the biggest gambles in the history of space exploration, the unmanned explorer is designed to meet up in 2014 with Comet 67/P Churyumov-Gerasimenko 675 million kms (422 million miles) from home.

The goal is to unlock the secrets of these lonely wanderers of the cosmos, whose origins date back to the dawn of the Solar System, some 4.5 billion years ago, before planets existed.

To get to its distant meeting point, Rosetta has had to play planetary billiards for five years, using four "gravitational assists" from Earth and Mars as slingshots to build up speed.

Now racing through the asteroid belt between Mars and Jupiter at 47,800 kph (29,925 mph), Rosetta on Saturday will come within 3,200 kms (2,000 miles) of a potato-shaped rock, Lutetia.

The two-hour flyby is Rosetta's second swing past an asteroid in its trek but offers by far the best chance of a harvest for its battery of scientific instruments, said Gerhard Schwehm, Rosetta's mission manager.

Lutetia, measuring 134 kms (83.75 miles) in diameter, "is a massive object and the flyby is relatively close, which means there will be a little disturbance of our trajectory," Schwehm said in an interview.

"It will be a very, very tiny deviation, but enough for us to measure (Lutetia's) mass, and with the data on its image and shape, that will give us a handle on its density."

Such knowledge could one day be a lifesaver, explained Schwehm.

If a rogue asteroid enters on a collision course with Earth, knowing its density will help the planet's defenders to determine whether they should

try to deflect the rock or, instead, blow it up.

Once widely dismissed as bland lumps of debris left over from the building of the planets, asteroids have turned out to be intriguingly individual.

They are extremely different in shape and size, from just hundreds of metres (yards) across to behemoths of 100 kms (60 miles) or more, and also vary in mineral flavours.

Most measurements suggest Lutetia is a "C" type of asteroid, meaning that it contains primitive compounds of carbon. But others indicate it could be an "M" type, meaning that it holds metals.

"If Lutetia is a metallic asteroid, then we have found a real winner," said Rita Schulz, a Rosetta project scientist.

For one thing, it could rewrite the theory about asteroid classification. Metallic asteroids are far smaller than Lutetia: they are deemed to be fragments of far larger rocks that, in the bump and grind of the asteroid belt, were smashed apart.

In July next year, Rosetta goes into deep hibernation to save power. If all goes well, it will wake up in January 2014 and then send down a refrigerator-sized lab called Philae, which will anchor onto the comet's icy crust and carry out tests of its surface.

For all their scientific rigour, the Rosetta team will be crossing every finger that the Big Sleep will go well, admitted Schwehm.

"You don't want in your wildest dreams to be sitting there in 2014 and the little beast doesn't switch on," he said wryly.