

Re: Slingshot around Jupiter

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- *From:* rcochran@xxxxxxxxxxx
 - *Date:* 14 Dec 2006 14:03:52 -0800
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PP@xxxxxx wrote:

I saw on a video where a small spacecraft was heading for Pluto and would do a loop around Jupiter on the way for a little boost. Does it have to do a burn to get into orbit, then another to get out of orbit, or is its path only being slightly bent by the pull of Jupiter?

Theoretically, no burns. In practice, there may be minor guidance burns to fine-tune the trajectory. It's sometimes called a "hyperbolic orbit". A google search of that term brings up lots of hits.

Why do that? From the point of view of Jupiter's center of mass, the probe just enters from one direction and leaves in another direction, with equal speed coming and going. But from the point of view of the center of the solar system, the probe steals some momentum from Jupiter. This insignificantly slows down Jupiter's orbit, but it adds significant speed to the probe's path through the solar system.

Imagine bouncing a ball against the flat front of a truck in a parking lot. The ball hits the truck with a certain velocity, and rebounds with the same speed in a new direction. Now repeat the experiment with the truck travelling 60mph down the road. You toss the ball up at nearly 0mph, and it rebounds from the truck at around 120mph. The truck driver just sees a repeat of the parking lot experiment, – you toss the ball at 60mph relative to him, and it rebounds at 60mph relative to him, but in a new direction.

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