input from reliable calculations such as those reported by Kato *et al.* for the Bose–Hubbard optical lattice. This work is indeed an important milestone in the quantitative study of phase transistions in optical lattices.

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SPACE EXPLORATION

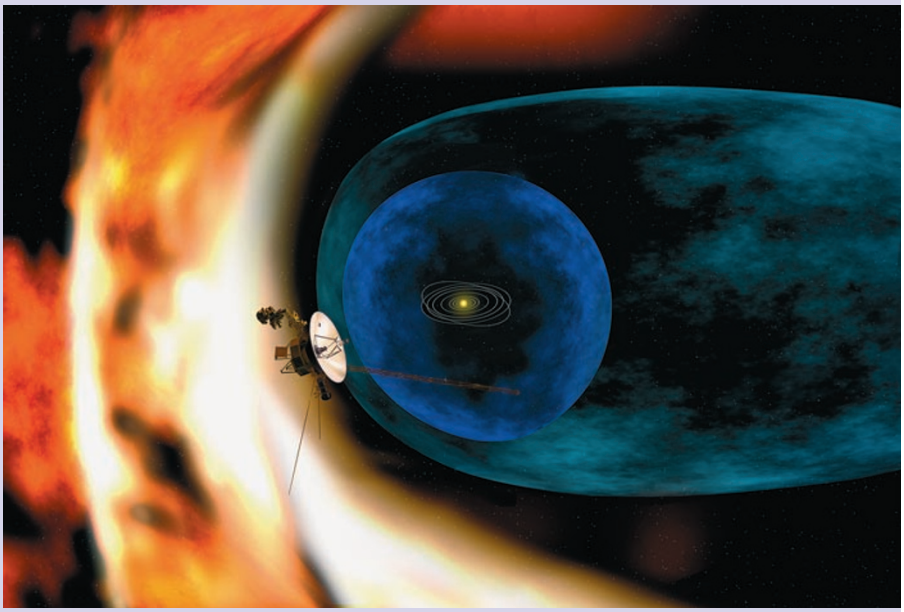
Boldly gone

Voyager 2 has left the Solar System. A series of papers in *Nature* documents its flight through the 'termination shock' of the heliosphere, as it heads out into the interstellar region (*Nature* **454,** 63–83; 2008).

Voyager 2 (shown in the illustration) and its twin, Voyager 1, embarked on their Grand Tour of the Solar System in 1977, flying past every one of the outer planets except Pluto. Although launched 16 days later than Voyager 2, but travelling in a different direction and at different speed, it was Voyager 1 that was first to reach the termination shock, in December 2004.

The shock marks the edge of the bubble known as the heliosphere, created by the solar wind of electrically charged particles (plasma). At the termination shock, the solar wind is slowed abruptly from supersonic to subsonic speeds by the pressure of gas and the magnetic field in interstellar space. Although it was initially expected that the heliosphere would be round, data from Voyager 1 suggested otherwise. Voyager 2, passing through the termination shock in 2007 at a point closer to the Sun and further south, confirmed the observation, indicating a possible local anisotropy of the interstellar magnetic field.

In fact, Voyager 2 passed the termination shock several times, owing to the oscillatory nature of the heliosphere, and was able to make detailed measurements of plasma waves, magnetic fields and energetic particles. Among other interesting findings, the data show unexpected temperature discrepancies that suggest a major role for 'pick-up' ions — interstellar neutral atoms that become ionized when entering the solar wind — in the shock's dynamics.



NASA/JPL

The Voyager twins may remain operational for a decade or more, pushing further into the uncharted territory of interstellar space. In contrast, NASA's Messenger spacecraft is probing the innermost regions of the Solar System, having completed the first flyby of Mercury for 33 years (*Science* **321,** 58–94; 2008).

Complementing and expanding on the analyses performed by Mariner 10 in the 1970s, Messenger has imaged more of the planet's surface, and in different lighting conditions. The instruments on board have provided rich data on Mercury's atmospheric and surface composition and its topography, as well as mapping the planet's magnetic field and its interaction with the solar wind. More flybys are scheduled before Messenger moves into orbit around the planet in 2011.

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