

# WILLIAM H. PICKERING LECTURE



## Rocketing to the Future: Space Electric Propulsion

19 August 2019 | JW Marriott, Indianapolis, Indiana

OPEN TO THE PUBLIC

One of NASA's most remarkable interplanetary missions, the Dawn spacecraft, used ion propulsion to orbit and explore the two largest uncharted worlds in the inner solar system, dwarf planet Ceres (2015–2018) and protoplanet Vesta (2011–2012). Dawn is the only spacecraft ever to orbit a body in the main asteroid belt, the only spacecraft to orbit a dwarf planet, and the only spacecraft to orbit two extraterrestrial destinations. Dawn's mission would have been impossible without its xenon-fueled ion propulsion system, which ultimately provided a total effective velocity change of 11.5 km/s (25,700 miles per hour) — comparable to that provided by the entire three-stage Delta II launch vehicle that started the spacecraft on its deep-space journey.

Ion propulsion is a type of space electric propulsion, a technology that has now been used on nearly 600 spacecraft. Over 40% of commercial geosynchronous satellites launched in recent years rely on the extraordinary capability of this technology.

Eight deep-space exploration missions with electric propulsion have been launched and yet we have just scratched the surface of what electric propulsion can do. Under development in 20 countries around the world, electric propulsion will continue to see widespread use on commercial communication satellites with likely prolific use in large constellations in low altitude orbits. It will be used for exciting new deep-space robotic science missions. Higher power versions are expected to benefit all forms of planetary defense techniques, human missions to Mars, and asteroid mining, and advanced versions will ultimately enable rapid transportation throughout the solar system.

The Pickering Lecture will describe this extraordinary space propulsion technology and how Dawn and other missions take advantage of it to accomplish amazing interplanetary adventures.

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### SPEAKERS:



#### JOHN BROPHY

Expert in Space Electric Propulsion, JPL Fellow



#### MARC RAYMAN

Dawn Mission Director, JPL Chief Engineer for Operations and Science, JPL Fellow

*The William H. Pickering Lecture is named for the former NASA Jet Propulsion Laboratory Director, to honor his initiation and leadership of America's unmanned scientific space program, from Explorer I in 1958 through the development of the Viking orbiters and the Voyager outer planet and interstellar missions. The lecture is open to all attendees and the general public.*

