Institutet för rymdfysik

Swedish Institute of Space Physics

Photos: Rick McGregor and Hans Nilsson (inset, right), IRF

Human beings have long been fascinated by space. At the Swedish Institute of Space Physics (IRF) researchers study the upper atmosphere and the near-space environments of the Earth and other planets. They are working hard to unlock the secrets behind the aurora, mother-of-pearl clouds and other less-obvious phenomena in the otherwise largely invisible world outside us.

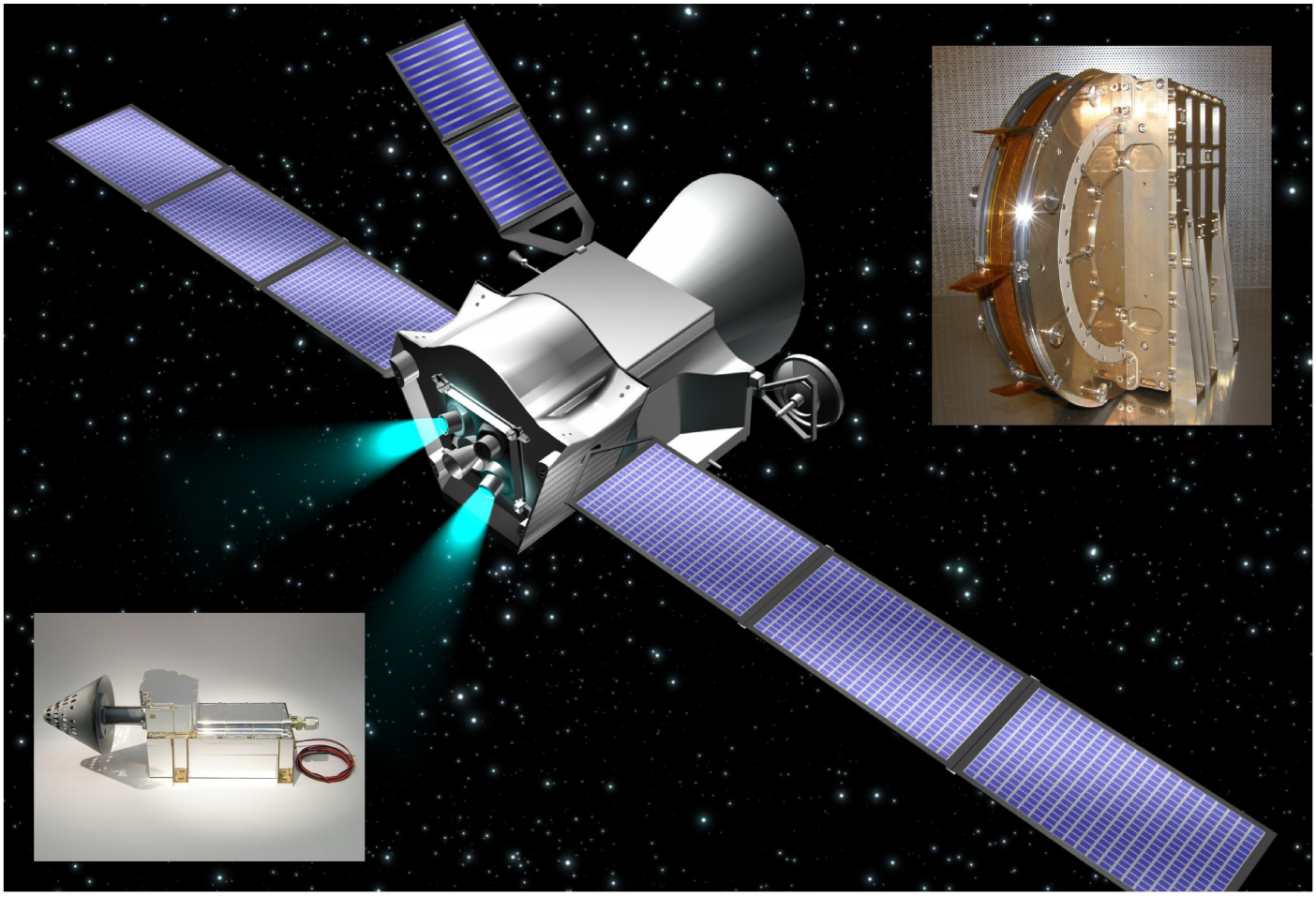
As a pure research institute, IRF has been able to combine long-term observatory activities with advanced space research projects carried out in collaboration with the European Space Agency (ESA) and the major space nations (USA, Russia and Japan) as well as newer ones such as China and India. Today IRF conducts extensive research programmes in space plasma physics, space technology and atmospheric physics—using both ground-based instruments and ones flown on balloons and satellites. In addition to its head office in Kiruna, the institute has offices on the university campuses in Umeå and Uppsala, and at IDEON Science and Technology Park in Lund.

Development of space science

IRF has made significant contributions to the development of space science in Sweden. It promoted the establishment of facilities such as the Esrange Space Center and the EISCAT incoherent scatter radar system. Over the last few decades IRF has also increasingly participated in university education in the field of space physics and technology. IRF's scientists and engineers contribute their expertise to the space engineering courses offered on the Space Campus in Kiruna by Luleå University of Technology through its Division of Space Technology and to space physics courses at Uppsala University.

Research in space and atmospheric physics

Researchers at IRF study the aurora and other



The BepiColombo spacecraft and IRF's satellite instruments MIPA and ENA which will study the planet Mercury as part of a combined European and Japanese space mission. (Artist's impression: ESA; photos: IRF)

processes in the ionosphere and magnetosphere related to "space weather"—the way the solar wind (a rapid stream of charged particles from the sun) interacts with the atmosphere on Earth and other planets. Other researchers concentrate on trace gases and processes in the polar atmosphere, studying such phenomena as the beautiful mother-of-pearl or nacreous clouds in the winter and noctilucent clouds in the summer. In addition IRF has scientists and graduate students dedicated to building satellite instruments to make precise measurements of particles out in space.

Instruments on over 30 satellites

IRF built its first satellite instrument for the European satellite ESRO 1 (1968) and thus helped pave the way for a Swedish national satellite programme. The first Swedish satellite, Viking (1986), marked the beginning of an era of success for this programme. The first Swedish satellite instrument to another planet was built by IRF in Kiruna and flew to Mars on a Soviet spacecraft in 1988. IRF has built its own nanosatellite, Munin (weighing only 6 kg), which was launched into the Earth's magnetosphere in 2000 for studies of the auroral zone. At present IRF has instruments on spacecraft orbiting Earth and Mars and had two on the Rosetta mission which studied comet 67P/Churyumov-Gerasimenko for over two years (2014-2016). In addition IRF has recently had instruments orbiting the moon, Venus and Saturn. It is presently developing instruments for the combined European and Japanese BepiColombo mission to Mercury (2018) and for ESA's JUICE mission to Jupiter (2022).

The space capital of northern Europe

IRF's head office in Kiruna is well situated for studies of the atmosphere and the magnetosphere. Its position under the auroral oval and at the edge of the polar vortex makes it an excellent base for researchers in both space plasma physics and atmospheric physics. Indeed, researchers often come to Kiruna from other parts of Europe and from North America to conduct campaigns to study the break-down of ozone during the polar winter. Together with IRF's scientists they help us to understand the world outside our sheltered planet.

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