

can generate electric fields around 35 MV/m – double that used at the LCLS – which allows electrons to be accelerated over a much shorter distance. Finally, the facility uses a so-called short-period in-vacuum undulator system to generate the X-rays. Ishikawa adds that the facility will be better suited than the LCLS for carrying out precision measurements given the sub-angstrom X-ray wavelengths the facility can generate.

### Opportunity knocks

Although researchers in Japan are excited about what new science SACLA itself can do, there is much anticipation for what Ishikawa describes as a “unique” experiment. Plans are afoot to combine SACLA’s and SPring-8’s beams in what is known as “pump–probe” techniques. This will let researchers use SACLA’s high-brilliance beam to generate excited and exotic states in materials and then deploy SPring-8’s high repetition rate to observe how the sample is changing. First experiments using SACLA and SPring-8 are planned to start later this year,

## A SOR-RING history of synchrotron radiation in Japan

On a tour of the RIKEN Harima campus I am led into the public-relations building near the site’s main gate. In a room used for outreach programmes, where Japanese school children come to learn about synchrotron radiation at SPring-8 and the new SPring-8 Angstrom Compact Free-Electron Laser (SACLA), on show are magnets and accelerator components demonstrating the country’s rich history in synchrotron radiation. At one end of the building is a piece of history for Japanese researchers – the complete 17.4 m circumference SOR-RING synchrotron.

First constructed in 1974 in Tokyo, SOR-RING was the world’s first electron storage ring dedicated to generating synchrotron light. The facility was located at the Institute for Nuclear Study at the University of Tokyo and operated until 1997 – the same year

which according to Ishikawa will dictate the research for the following two years. “Combining SACLA and SPring-8 will give us new possibilities that perhaps weren’t previously foreseen,” adds Ishikawa. “This is very exciting for us, I am sure it will open up new frontiers.”

Given that SACLA is the world’s second XFEL, it is perhaps surprising that in the first proposal round, which



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SPring-8 opened (see main text).

SOR-RING consisted of eight bending magnets and four so-called quadrupole triplets, which act to focus the electron beam. Using this set-up, SOR-RING could accelerate electrons to around 500 MeV. After SOR-RING retired it was moved to the RIKEN Harima site to be put on display.

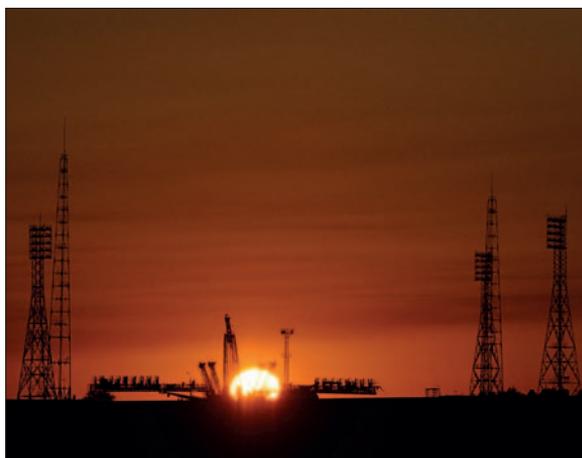
began on 7 March, only seven of the 25 submissions to use the lab’s beam-lines were from foreign users. “We hope to have more foreign researchers in the future,” insists Ishikawa. Indeed, overseas researchers should not be too put off by the lab’s remote location. “When it does snow, the bus somehow still manages to get here,” Yamamoto jokes. “We keep the facility running in whatever weather.”

## Space

# Putin splashes cash as Russia plans grand space vision

Russia looks set to unveil an ambitious new space strategy that will see the country launch a series of scientific missions across the solar system. The plans are outlined in a draft strategy document from the Russian space agency Roscosmos that was leaked to the Russian daily newspaper *Kommersant* in late March. The leak was followed last month by an announcement from Russian president-elect Vladimir Putin that the government will allocate \$5bn in 2012 to the country’s existing national space programme, which runs until 2015. This is a big rise compared with last year’s figure of \$3.8bn.

According to *Kommersant*, the new space strategy sets out Russia’s space plans until 2030. The newspaper quotes the strategy, which has not been made public, as seeking to “ensure that the Russian space industry maintains its world-class standards and solidifies its position among the top three space powers”. Russia is said to want to boost its share of the global space market to 10% by 2030, compared with just



### Lofty ambitions

Russia will build a new \$20bn space port near Uglegorsk in eastern Russia to reduce its dependency on the existing Baikonur Cosmodrome (pictured) in Kazakhstan.

0.5% in 2011. Indeed, Vladimir Popovkin, head of Roscosmos, estimates that delivering the space strategy will require around \$5–6.5bn each year until 2030.

Central to the strategy is a series of missions to bodies in our solar system. This includes unmanned probes to Venus and Jupiter as well as manned and robotic missions to the Moon. The agency has even more ambitious plans when it comes to Mars. “In co-operation with for-

own partners, Roscosmos plans to deploy a network of permanent research stations on Mars,” quotes *Kommersant* from the document.

The strategy also highlights the development of new launch vehicles. A series of Angara rockets is being built to replace Zenit and Proton – which have been the workhorses of Russian space launches since the 1960s. The Soyuz spacecraft, currently used to ferry astronauts to and from the International Space Station, is set to be replaced by a piloted transport ship, known unofficially as “Rus”, that would be capable of undertaking a range of orbital and lunar missions.

Any future scientific missions are likely to be launched from the new \$20bn Vostochny Cosmodrome, which the government is currently building near Uglegorsk in eastern Russia and is expected to be complete in 2018. It will improve Russia’s domestic launch capability and will help the country to reduce its dependence on the existing Baikonur Cosmodrome in Kazakhstan.

Simon Perks