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Current events

1. Inauguration of SwissFEL, Paul Scherrer Institut, Villigen, Switzerland

On 5 December 2016, the Paul Scherrer Institute (PSI) held an inauguration ceremony for its new large-scale research facility SwissFEL, with Johann N. Schneider-Ammann, President of the Swiss Confederation, in attendance. The Swiss free-electron X-ray laser, having a maximum electron beam energy of 5.8 GeV and an overall length of 713 m, will drive important developments in the areas of energy and environment, information technology and health. Using the short pulses of X-rays from this facility, researchers will be able to observe extremely fast processes such as the formation of new molecules in chemical reactions, determine the detailed structure of biologically important proteins, and clarify the precise composition of materials. Currently one of just four such facilities worldwide, SwissFEL will play an important role in international research. The first pilot experiments are planned for 2017. The costs of SwissFEL, 275 million Swiss francs, are largely borne by the federal government. Canton Aargau co-finances the project with 30 million francs out of Swiss Lottery funds.

"SwissFEL is the most ambitious project that we have ever undertaken at PSI", said PSI Director Joël Mesot, who opened the inauguration ceremony – a project made possible only through the commitment of PSI staff but also with vital support from industry, which delivered the key components for SwissFEL, as well as from politics at every level, from the federal to the cantonal and municipal levels. "As the Swiss Light Source already does, SwissFEL will attract leading researchers from Switzerland and the whole world", said Roger Falcone (UC Berkeley), chairman of the PSI Advisory Board. "Today is one of the most beautiful moments since I took office", said Aargau Government Councillor Alex Hürzeler, as he emphasized the benefits of SwissFEL for Aargau as a high-tech hub and for Switzerland as a whole: "SwissFEL contributes to our ability to reinforce the positioning of Switzerland as an innovation engine." Federal President Johann N. Schneider-Ammann also stressed the importance of research and innovation for Switzerland. He compared the Swiss free-electron X-ray laser SwissFEL to the Gotthard Base Tunnel, likewise opened in 2016: "Both tunnels are regarded as

PSI Director Joël Mesot explaining to Aargau Government Councillers Urs Hofmann and Alex Hürzeler the workings of the SwissFEL undulators (Photograph: Paul Scherrer Institute/Markus Fischer).

Just a second after pressing the buttion. From left to right: PSI Director Joël Mesot, SwissFEL project leaders Rafael Abela and Hans Braun, and Johann N. Schneider-Ammann, President of the Swiss Confederation. (Photograph: Paul Scherrer Institute/Markus Fischer).

technical masterpieces, both tunnels embody Swiss know-how, and with both tunnels we are venturing into new territory." "Switzerland places great value on excellent infrastructure", he said – one of the reasons Switzerland regularly occupies top spots in innovation rankings. SwissFEL project leaders Rafael Abela and Hans Braun were the last speakers at the inauguration ceremony. "After many years of planning, construction and installation, a new SwissFEL era is beginning at PSI: the time of the scientific harvest is at hand", Abela said. Federal President Johann N. Schneider-Ammann and PSI Director Joël Mesot then 'pressed the red button', launching the Swiss free-electron X-ray laser SwissFEL into operation.

First lasing of SwissFEL

On Friday 2 December at 1 am, SwissFEL observed for the first time FEL lasing in the undulator line. The lasing was achieved with a commission beam of low intensity, repetition rate and energy, *i.e.* 100 pC bunch^{-1}, 1 Hz and 377 MeV. The 12 undulators were set to a K value of 1.2. The resulting wavelength computed from beam energy and undulator K value was 24 nm. The FEL signal was observed with a Si-diode detector. The spontaneous radiation signal with uncompressed electron beam increased by a large factor when the beam was compressed from 10 ps to about 1 ps at constant charge and electron beam energy. By opening the undulator gaps a first FEL gain curve was measured.

Aerial view of SwissFEL in the forest of Würenlingen. As time progresses, the scar in the landscape will turn green.