Press release
(15 May 2006)

The synchrotron SOLEIL machine has started operation

SOLEIL has accelerated and injected electrons for the first time in its storage ring on May 14, 2006 at 2:00 am. These first tests went off very well and the first synchrotron radiation photons produced by these 2.75 GeV electrons were observed. Tests and adjustments of the accelerators parameters will go on until summer, during which X-rays will be dispatched on the first beamline. A few months from now, SOLEIL, the new French synchrotron radiation source, will open its doors and greet more than 2000 users a year: chemists, physicists, biologists, environmental or nanomaterial specialists, geo- or astro-physicists or even museum curators will meet around SOLEIL and its light with exceptional characteristics.

On May 14, the electrons turned at a speed close to that of light in the 354 m circumference storage ring. The first 2.75 GeV beam injection from the Booster started around noon on May 13. After 12 hours spent on measurements and adjustments, the electrons made a full turn, and a second one and a third one with adjustments of the storage ring parameters being very close to the theoretically predicted values.

To achieve such a quick start is an outstanding performance which demonstrates that the various pieces of equipment used to establish the beam operate according to specification and, notably, that the 310 magnets of the ring are perfectly aligned. This is a crucial step in the commissioning of SOLEIL.

To achieve this objective, several notable milestones have been cleared since the first swing of the pickaxe marked the beginning of the construction of SOLEIL three years ago: in July 2005 the first electrons were produced and accelerated up to 100 MeV in the linear accelerator; by October 2005, the first electrons were accelerated up to 2.75 billion eV in the Booster ring. The coming weeks will be dedicated to carrying out all the required adjustments and tests preliminary to maintaining the intensity and the trajectory of the electrons in the ring for several hours. Then, by this summer, scientists will start testing the optical and experimental beamlines devices using the extremely brilliant photon beam.

REMINDER

Located on the Plateau de Saclay, in the Essonne department, SOLEIL is the second 3rd generation synchrotron to be built in France – the first one: the ESRF in Grenoble, was a European project. The construction of such a device falls at the same time within the scope of large work sites and high precision mechanics. Bunches of electrons are accelerated in order to produce an exceptionally brilliant radiation covering a very large range of wavelengths: from infrared through ultra-violet to X-rays. The characteristics of this light (intensity, focalization, stability, polarization, etc.) make it possible to observe matter down to the atomic scale and carry out experiments formerly inconceivable in both fundamental and applied research as well as in research of industrial interest. You will find at SOLEIL many fields attracting both industry and science: biology, chemistry, science of materials, environmental science, physics, earth sciences, and also the cultural and archaeological heritage. The characteristics defined for SOLEIL (operating energy, number of undulators, wide spectral range from infrared to X-rays, brilliancy, continuous injection for beam stability at micron level etc.) rank it at the highest level of international competition.

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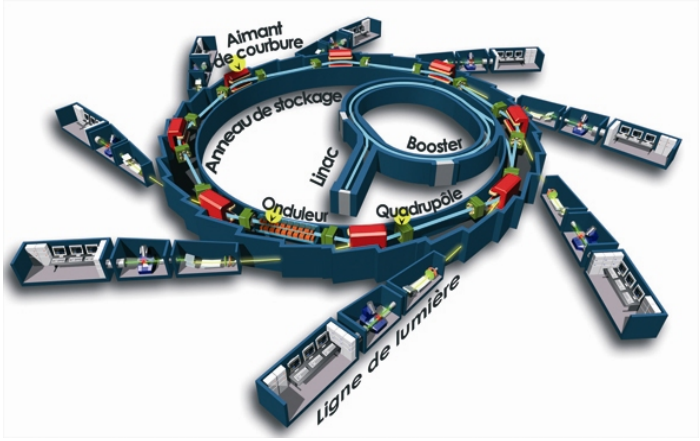

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1) Synchrotron diagram

- LINAC (linear accelerator): the particles are produced by an electron canon and undergo a first acceleration
- Booster: the second accelerator is oval. Its role is to increase the energy of the particles until they reach the value set by the SOLEIL designers, or 2.75 billion electron-Volts
- Storage ring: the electrons will turn inside the ring for several hours in order to produce the synchrotron radiation each time they go through a curve. To achieve this, "bending magnets" bend the normally linear trajectory of the electrons. Other magnets, the quadrupoles, focus the beam of electrons in such a way that its diameter is that of a hair. The undulators make it possible to produce synchrotron radiation in the straight sections of the ring.
- the beamlines, located all around the ring, constitute the equipment as a whole ensuring the treatment and exploitation of the synchrotron radiation. Each beamline is an independent laboratory. If only eight of them are shown here in order to simplify the diagram, actually, 23 will be available by 2009 at SOLEIL, which has been designed to accommodate up to 43 beamlines.

2) Inside view of the storage ring during the installation of its magnetic elements

3) Experimental hall. The installation of the beamlines is underway.

4) The white spot at the center is a trace left by the first photons produced by the beam in the storage ring (May 14, 2006)

(3)

(4)