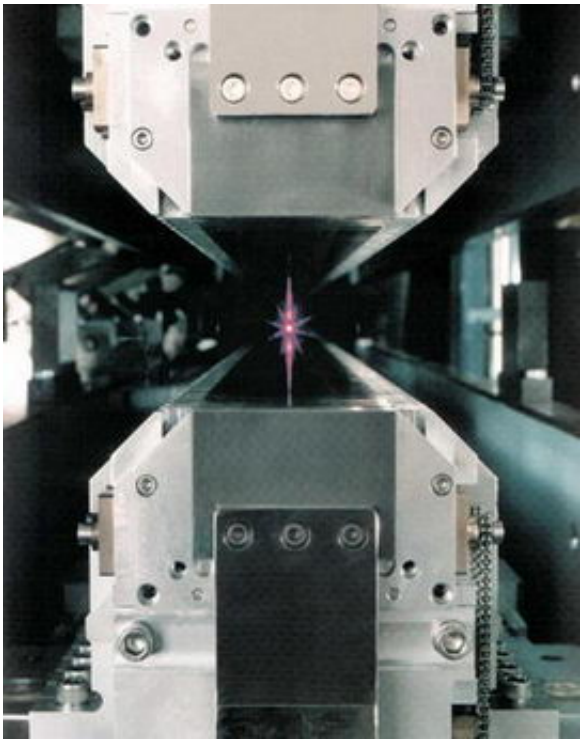
Laser light in the deep infrared

August 23 2006



One of the undulators at the FZR.

Free-electron lasers (FEL) are large and expensive, but they can deliver unique light for research and applications. On August 21, 2006, at the Forschungszentrum Rossendorf (FZR) in Dresden, Germany, the second undulator of the free-electron laser facility went into operation, producing light up to the hard-to-access range of the deep “far” infrared.

An undulator is the heart of a free-electron laser, because it transforms

the energy of fast electrons into intense laser light through a special arrangement of magnets.

The Dresden FEL now covers the wavelength range, invisible to humans, from 3 to 150 micrometers. The asset of every free-electron laser is its tunability, i.e., the wavelength or the "color" of the light can be adjusted at will over a large range.

Scientists at FZR have a particular interest in this far-infrared light, which is located between the ranges of microwaves and the infrared and is often called Terahertz (THz) radiation. The generation and application of this radiation has become a very hot topic recently, with many researchers worldwide active in this field. While many practical applications will eventually require compact and cheap sources, basic research needs also intense sources - and to date there are virtually no other intense THz sources available apart from free-electron lasers.

At FZR, THz radiation is used in particular to study the dynamical behavior of electrons in semiconductor nanostructures. Such knowledge is important for the development of ever faster electronic devices, and thus, computers. The FEL at the Forschungszentrum Rossendorf is supported by the European Union (EU) as a user facility under the name FELBE.

200 experts from all over the world will have the chance to visit the new light source at FZR on August 30. They are participants of the FEL2006 Conference, taking place in Berlin from August 27 to September 1. This 28th international FEL conference is jointly organized by BESSY, the organization who runs the well-known synchrotron source south of Berlin, and FZR.

Source: Forschungszentrum Rossendorf