

# **THE SOLEIL STORAGE RING FREE ELECTRON LASER**

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Following the first user experiments carried out on Super-ACO in France, DUKE in USA, ELETTRA in Italy, UVSOR in Japan, Storage Ring Free Electron Lasers appear to be unique sources of tuneable coherent light, naturally synchronised with synchrotron radiation for pump-probe two-colour experiments. The European Storage Ring source at ELETTRA achieved the oscillation at 190 nm, the record of the shortest wavelength in the oscillator configuration.

The SOLEIL FEL will offer a picosecond pulse coherent source at a high repetition rate, tuneable between 350 nm and 150 nm in the oscillator configuration and down to 30 nm by coherent harmonic generation (from the FEL itself or from an external Ti:Sapphire laser). The FEL can operate on two different wavelengths simultaneously. The FEL is fully coherent (at the Fourier Limit temporally and at the diffraction limit spatially). The polarisation can be adjustable. Pump-probe two color experiments can use a combination of sources. It is considered to couple the FEL with a UV-visible white light synchrotron beamline, a VUV undulator beamline, a X-UV undulator beamline and an IR- spectromicroscopy beamline.

The FEL could be viewed as a “complex insertion device”, operating under particular conditions (lower energy 1.5 GeV and temporal structure mode (4 or 8 bunches)).

The Scientific Case is composed of proposals from various domains: material science, surface science, gas phase spectroscopy and molecular dynamics, photochemistry and photobiology, use of coherence and non linear optics.