

ARC-EN-CIEL, the present FEL activity and the scientific case

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ARC-EN-CIEL (Accelerator-Radiation for Enhanced Coherent Intense Extended Light), the French project of a fourth generation light source aims at providing the user community with coherent femtosecond light pulses covering from UV to soft X ray. It is based on a CW 1 GeV superconducting linear accelerator delivering high charge, subpicosecond, low emittance electron bunches with a high repetition rate. The FEL is based on the injection of High Harmonics in Gases in a High Gain Harmonic Generation scheme, leading to a rather compact solution. The produced radiation extending down to 0.8 nm with the Non Linear Harmonic reproduces the good longitudinal and transverse coherence of the harmonics in gas. Optional beam loops are foreseen to increase the beam current or the energy. They will accommodate fs synchrotron radiation sources in the IR, VUV and X ray ranges and a FEL oscillator in the 10 nm range. An important synergy is expected between accelerator and laser communities. Indeed, electron plasma acceleration will be tested for possible future compact electron beam sources for Xray FEL. Fs hard X ray can also be produced by Thomson Scattering. An overview of the user scientific case will also be given. Present studies concern the test of key choices for ARC-EN-CIEL, such as seeding with High Harmonics produced in gas, and the ARC-EN-CIEL phase 1 design.