

Scientific Experiments at BESSY using Coherent Synchrotron Radiation

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Coherent synchrotron radiation (CSR) from a storage ring is a new spectroscopic source between microwaves and thermal black body radiation offering broadband radiation in the THz range. During the past few years, this new technique to generate powerful, stable, coherent sub-THz and THz radiation from the electron storage ring has been established at the electron storage ring in Berlin (BESSY). The spectral range between 3 and 30 wavenumbers (0.1 – 1 THz) which can be only poorly accessed by conventional sources is now covered by operating BESSY in special machine modes. Here, up to 10^8 more brilliance than from a black body source has been achieved. The production of stable, high power, coherent synchrotron radiation at THz and sub-THz frequencies at BESSY opens a new region in the electromagnetic spectrum offered at synchrotron radiation sources which now can be applied for imaging, spectroscopic and microscopic methods in solid state physics, material sciences and life sciences. The feasibility of using the coherent synchrotron radiation in scientific applications has been proven at the infrared beamline IRIS. Beside the characterization of the coherent synchrotron radiation source this talk will present a couple of applications spanning from spectroscopic investigations of new superconducting materials to scanning near-field microspectroscopy.