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Studies of fluorescence dynamics in biological systems using the pulsed structure of the SRC

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A beamline for time-resolved fluorescence spectroscopy of biological systems is under construction at the Synchrotron Radiation Center. The fluorometer, operating in the frequency domain, will take advantage of the time structure of the synchrotron-radiation light pulses to determine fluorescence lifetimes. Using autocorrelation techniques, the instrument can achieve an ultimate time resolution on the order of picoseconds. Preliminary experiments have shown that reducing the intensity of one of the fifteen electron bunches in the storage ring allows measurement of harmonic frequencies equivalent to the single bunch mode. This significantly extends the range of lifetimes that can be measured. The wavelength range (down to 200 nm), the range of measurable lifetimes, and the stability and reproducibility of the storage ring pulses should make this beamline a versatile tool for the investigation of the complex fluorescence decay of biological systems.