Impact of Synchrotron Radiation on Biology and Biophysics

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In a span of 28 years since the first application of synchrotron x-radiation,[1] the number of users has exploded from a half dozen to several thousands. Flux, compared to pre-synchrotron levels, has increased 20-million times–outpacing by a factor of 1000 the much publicized increase in speed of microprocessors. Time-resolved muscle diffraction, high-speed protein crystallography, MAD phasing, and EXAFS would be unthinkable without synchrotron radiation. The first part of this session will outline these historical advances. Biotechnology is starting to invest in synchrotron radiation, as witnessed by the building of a beamline at the Advanced Photon Source by a consortium of drug companies. The state of biotechnology's involvement in synchrotron radiation is the topic of the second part of this session. As we explore the opportunities of third-generation (undulator) sources, new, tremendously more powerful sources are planned. The third part of this session will discuss the promise of undulators and the potential–and limits–of the fourth-generation sources for biology and biophysics.

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[1]Rosenbaum, G., Holmes, K. C., Witz, J. 1971 Nature, 230:434-437.