

Time-resolved diffraction experiments in the nanosecond range

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A history of the development of time-resolved diffraction experiment on the synchrotron in Novosibirsk INP started in 1975. There are two factors that are the basis of all time-resolved experiments: 1) a powerful insertion device and x-ray optics providing high intensity of the synchrotron radiation, and 2) fast position-sensitive, area detectors and acquisition systems that quickly collect diffraction data. There are no limits for improving the first one, but there are a lot of problems with detectors, when the time resolution is better than a microsecond. We think that it is impossible to use traditional diffraction schemes for experiments in the nanosecond scale.

For a diffraction experiment with nanosecond time resolution, we propose a new scheme using a fast electron beam scanning in the undulator. The scanning will be made by fast correctors of the electron beam trajectory in the undulator only. The electron trajectory will not be disturbed in the other parts of the storage ring. A new detector will be developed for this experiment, which will be synchronized with correctors.

A prototype of this experiment was realized at the storage ring VEPP-3. The influence of the fast corrector on the behavior of the electron beam and synchrotron radiation was investigated. A prototype of a new detector was used in this experiment.