Application of low temperature devices at modern photon sources

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Extremal high photon flux of new generation photon sources requires superconductive insertion devices which operate at helium temperature. Registration of photons after interaction with probe is frequently performed via cryogenic X-ray detectors with working temperature below 1 K. Different types of cryostats belong to standard equipment of almost every material science beamline which gives an opportunities in precise structure and dynamic studies varying other parameters such as pressure, magnetic and electrical field et. al. Biology oriented beamlines strongly benefit from low temperature which decreases the radiation damage of biological complexes, increases the data collection time and significantly improves the quality of structural information. At free-electron lasers the serial femtosecond crystallography developed for the determination of the structure of tiny crystals works at cryogenic and room temperatures and gives unique opportunity for verification of smallest structural features. The cryo-devices at photon sources should follow requirements of experiments such as size of beam and energy of photon, speed of measurements and data collection systems.

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