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Photon beam stabilization at the beamline 6C Bio Medical Imaging of PLS-II

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Photon beam stabilization is a basic issue for reliable data acquisition. The beamline 6C Bio Medical Imaging of Pohang Light Source-II (PLS-II) is a dedicated station for full-field X-ray projection imaging at micron spatial resolutions. It uses Bragg-crystal monochromators which have a beam expanding capability. Although the beam size is relatively large, about one centimeter vertically, we still experience severe photon beam instability which is manifested as beam position drifting in the vertical direction. The instability appears thermal in origin because it initiates with changes of the heat load on crystals and gets stabilized over time.

In order to study the instability in detail, we recently installed an ion chamber just downstream of the beam exit for real time monitoring of the beam intensity. Surprisingly, we found that the beam position drifting can be corrected by adjusting the pitch of the second crystal of the monochromator in a direction that keeps the ion current constant. By repeatedly applying this simple measure, the photon beam position is kept stable and the time-consuming CT data acquisition can now be performed quite reliably. This presentation describes the feedback control system along with the brief introduction of the beamline and its activity.

Keywords

photon beam position stabilization

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