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Beamline diagnostics on the new wiggler station for protein crystallography BW6 at DORIS

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Beamline diagnostics facilities on the protein crystallography wiggler beamline BW6 at DORIS monitor the geometries (location and direction) of the emitted and incident beams, the total power in the white beam, the monochromatic incident intensity, the polarisation, and the X-ray wavelength. We report on our observations of the total power in the white beam with a calorimetric device, and of the beam cross section and divergence, the total photon flux and the wavelength resolution in the monochromatic beam. The wavelength in the monochromatic beam is (during MAD phasing experiments) continuously monitored on a 10-100 ms time scale by recording and analyzing a powder diffraction pattern. The wavelength resolution is $\Delta\lambda/\lambda = 10^{-4}$. The PC-controlled system may close a shutter when the wavelength moves outside a defined interval. We plan to further develop the geometrical diagnostics system towards automatic realignment of the entire instrument by beam pattern analysis on the basis of ray-tracing calculations.

BW6 is equipped with a 28 period wiggler (4m; 1T; $E_c = 15.8$ keV). The X-ray optics include a plane and a toroidal mirror (SiC, Au-coated) with a 3.3 : 1 demagnifying imaging geometry. A double Si(111) crystal monochromator is set up in between.