A polarization analyzer has been designed for soft x-ray resonant diffraction experiments at the S K-edge. The Bragg angle of Graphite (0001) at the S K-edge is 48°, which makes it perfectly suited as polarization analyzer. Two Graphite (0001) crystals (12x12x2mm³) are mounted on small tangent-arm driven spring loaded stages with their diffraction planes in the horizontal and vertical plane for σ and π analysis of polarized x-rays. The diffracted x-rays are detected by small peltier cooled Si detectors with dimensions 1x12mm² with the longer dimension in the direction of diffraction, so that the detector can stay fixed.

These two polarization analyzers and an additional detector for the directly diffracted beam are mounted on a stage, so that the polarization of the diffracted x-rays can be determined just by moving the appropriate analyzer into the beam. The tangent-arm and the detector allow to scan ±50eV around the S K-edge. This set-up avoids mounting of the polarization analyzer on a rotation stage, which axis has to be aligned with the diffracted beam.

The tangent-arm is driven by motorized micrometers, which are equipped with encoders to obtain an angular resolution of 0.001°.

Figure 1: Picture of the polarization analyzer. The three blue boxes are the Si detectors looking at σ and π scattering (top and bottom) and at the unpolarized beam. The graphite crystals are rotated by small pico motors (red box) via a tangent arm. The pico motors are equipped with encoders. The whole set-up us mounted on a slide to move the desired analyzer and detector into the beam.

Submitting author: W. A. Caliebe, e-mail: caliebe@bnl.gov