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## Mechanical design of an off-axis parabolic mirror holder with six degrees of freedom

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The XRD (X-Ray Diffraction Chamber) is one of the endstations of the SCS instrument, specifically designed for experiments on solid targets. Its sample holder features six-degree-of-freedom motion, allowing for precise positioning and alignment of the sample. During THz experiments at the XRD endstation of the SCS instrument, a 2" off-axis parabolic mirror must be precisely positioned in six degrees of freedom under UHV conditions ( $10^{-7}$  mbar). Each axis is equipped with encoder feedback and adjustable limit switches. Because of the focus length of 50.8 mm (2 ") there is a very limited installation space. In operation, the mirror is translated and rotated into the X-ray beam path so that the THz and X-ray beams overlap exactly at the sample. After the measurement, the mirror has to be fully retracted from the beam path. The design challenge is to create a support system that is statically over-determined for rigidity. The system can be temporarily decoupled to form an under-determined mechanism for pre-alignment.

### Footnotes

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