High Resolution X-ray Diffraction

System Overview

**X-ray Generator** – Cu or Cr tube.

**X-ray Optics** –
- Incident beam optics
  - Bartels Ge(440) for ultra-high resolution
  - Bartels Ge(220) with Guttman mirror for 4 bounce
  - Hybrid mirror for high-resolution and ultra-high intensity, Polycapillary X-ray lens
- Diffracted beam optics
  - Channel cut analyser
  - Soller slits/collimators/monochromator

**Goniometer and sample stage** – minimum step size in \( \theta \) and \( 2\theta \) is 0.0001°, sample rotation (phi) is 360°, sample tilt (psi) is 180° and x,y,z movement from 0.01mm to a few cm.

**Sample alignment** – Mechanically aligned using dial gauge pre-aligned to correct sample height within a few microns or by using X-rays.

**Detector** – Proportional detector

**Features**
- PreFIX (Pre-aligned Fast Interchangeable X-ray modules) concept of modular exchange of functional components, no further system alignment is required
- Multi-modular primary and secondary optics can be selected to optimize performance in different applications
- Fully motorized \( \frac{1}{2} \) circle Eulerian cradle is flexible and accurate

**Applications**
- High-resolution rocking curves for epitaxial layers
- High-resolution reciprocal space mapping
- Texture analysis
- Residual stress analysis
- Phase analysis
- X-ray reflectivity and thin film thickness analysis
- Grazing incidence X-ray diffraction

**Detector**
- Proportional detector

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