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Supporting information for article:

A von Hámos spectrometer for diamond anvil cell experiments at the High Energy Density Instrument of the European X-ray Free-Electron Laser

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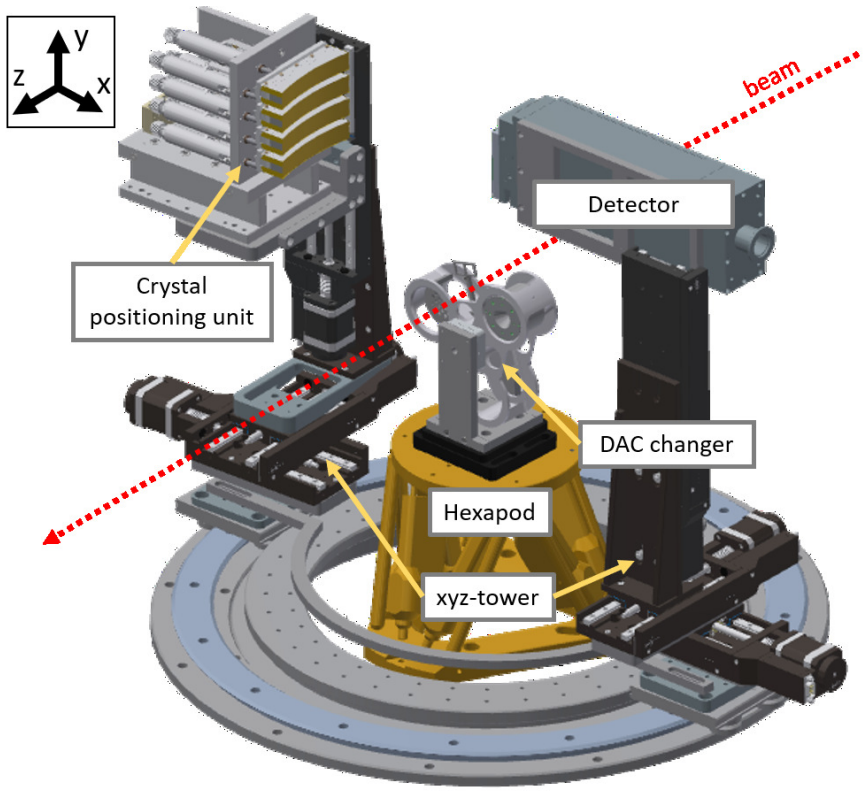

Fig. S1. CAD image of the spectrometer design in the vacuum chamber IC1 at HED. The spectrometer consists of two XYZ-towers located on a circular rail which are connected relative to each other on a fixed 180° angle. The four crystals are moved by a total of twelve linear motors (JJ X-Ray, 2021), four sets of three motors per crystal. The sensor of the 2D-Jungfrau detector is situated above the center of a hexapod, which is used for sample positioning.

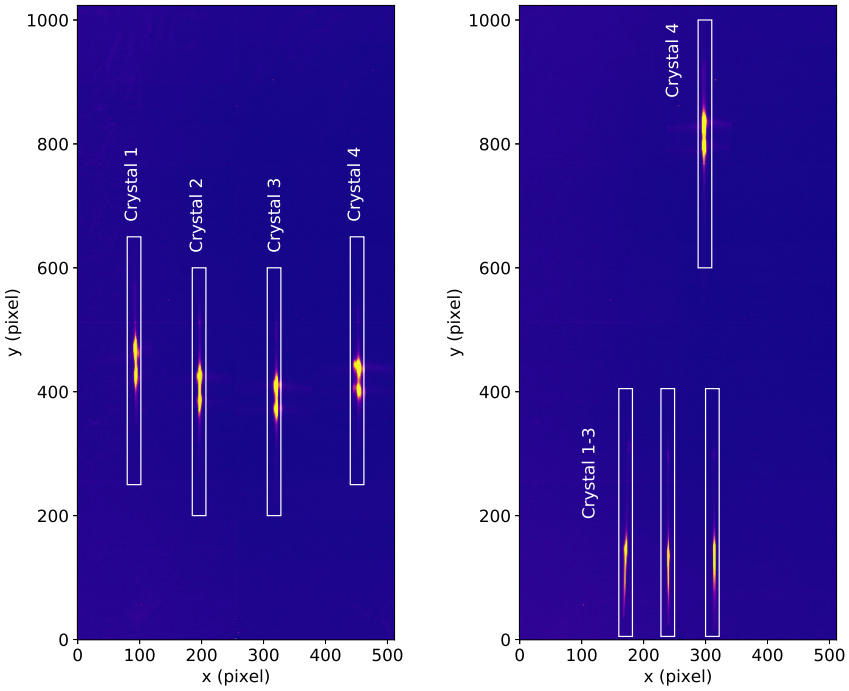

Fig. S2. [**Left**] Detector image for a Fe Kα measurement with four Si(111) crystals. [**Right**] Detector image for a Fe Kα and Kβ measurement with one Si(111) and three Si(531) crystals. The ROIs of each crystal are marked in white.

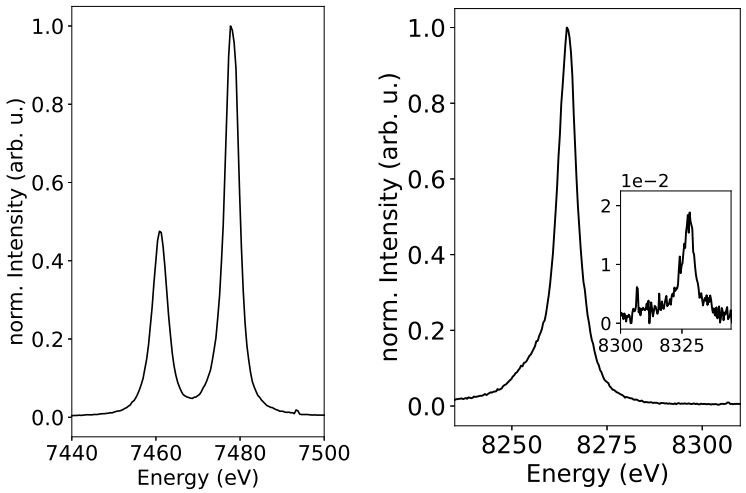

Fig. S3. **[Left]** Ni Kα emission **[Right]** Ni Kβ emission incl. vtc signal; measured

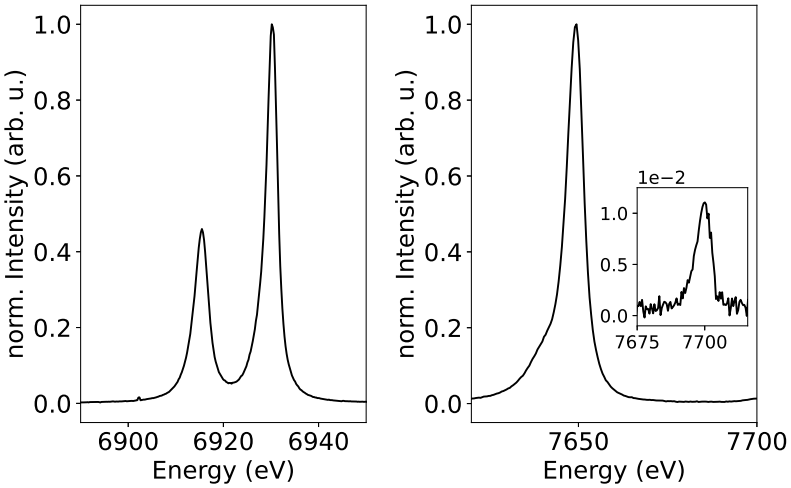

Fig. S4. **[Left]** Co Kα emission **[Right]** Co Kβ emission incl. vtc signal; measured

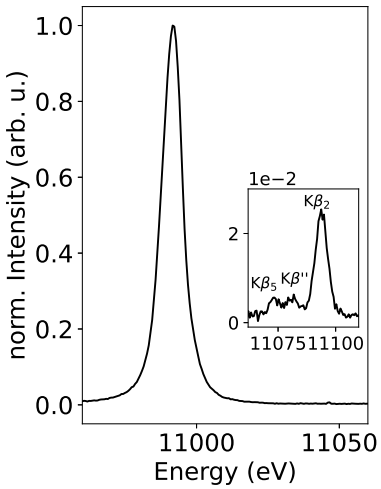

Fig. S5. GeO_2 Kβ emission incl. vtc signal; measured

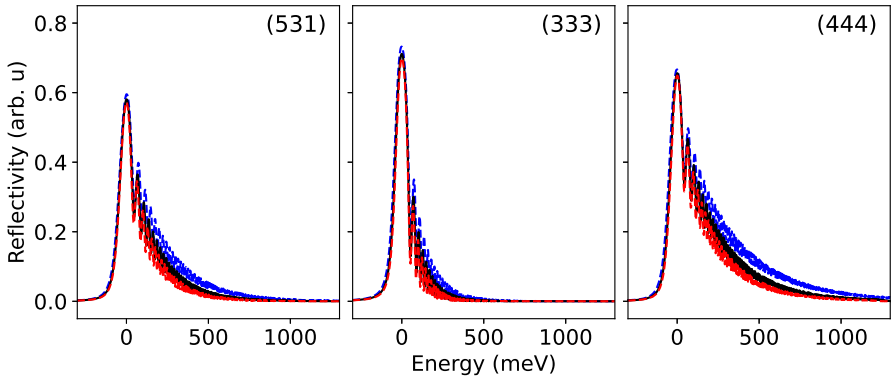

Fig. S6. Rocking curves for 250 mm bent, 180 µm thick Si(531), Si(333) and Si(444) crystals for a Bragg angle of 60° (blue, dashed), 70° (black, solid) and 80° (red, dashed) plotted against the energy difference to the Bragg energy. The data was calculated using the 1D Tagaki–Taupin equations (Takagi, 1962; Taupin, 1964; Takagi, 1969) in the pyTTE package (Honkanen & Huotari, 2021).

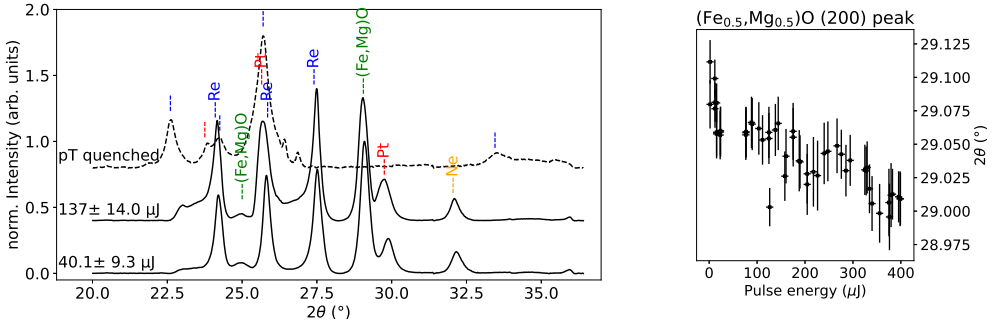

Fig. S7. [**Left**] XRD pattern taken during the experiment described in SUBSEC 4.1 for near ambient temperature runs and at 137 µJ. The pT-quenched state is shown as well (dashed). Re peaks (blue), Pt peaks (red), Ne peak (orange) and sample peaks (green) are marked. [**Right**] Peak shift of the $(Fe_{0.5}Mg_{0.5})O$ (200) peak with increasing pulse energies before the pressure collapse.

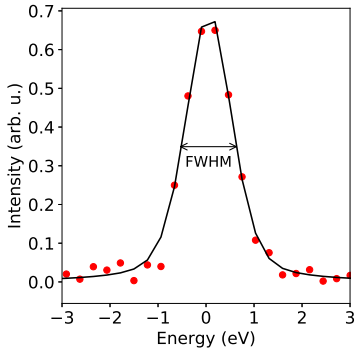

Fig. S8. Example for an elastic line for crystal 1 at 7150 eV using monochromatic beam. A Gaussian curve (black) is fitted to the measurements (red). The FWHM has a value of 1.1 eV.

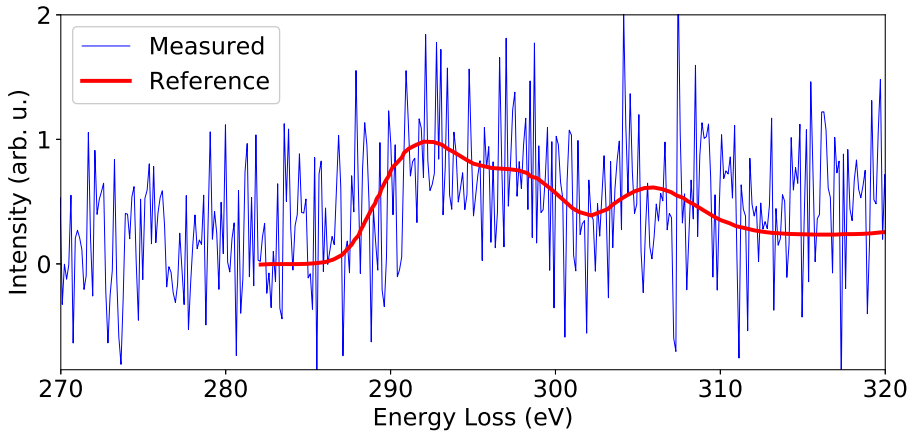

Fig. S9. Carbon K edge measured on a diamond plate background corrected (blue). The reference (red) was measured by Verbeni *et al.* (2009).