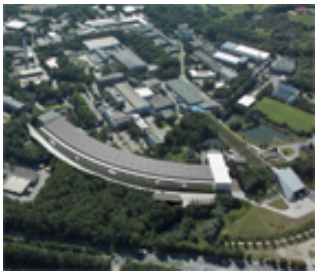

Contribution ID: **12** Type: **not specified**

The Extreme Conditions Beamline at PETRA III, DESY: Possibilities to conduct time resolved monochromatic and pink beam diffraction experiments in laser heated DAC

Monday 18 May 2009 15:15 (30 minutes)

Powder x-ray diffraction experiments in laser heated diamond anvil cells (DAC) have been a standard experimental technique used at all 3rd generation extreme condition synchrotron facilities over the last decades. However, the combination of single crystal diffraction at simultaneous high-pressure and –temperature using a laser heated DAC has not been realized. This is in part because single crystal diffraction pattern created by monochromatic beam can only be collected on an area detector when the sample within the DAC is rotated, resulting ultimately in the obstruction of the laser heating beam. However, rotations of the sample can be eliminated when one uses pink beam Laue diffraction.
In this paper we describe the design of the "Extreme Conditions Beamline"P02B at PETRA III, Hamburg, Germany, that will be used to conduct both monochromatic (8-80 keV) and pink beam diffraction experiments. Attention will be drawn to the pink beam capabilities of the station and the alternate use of monochromatic and pink x-ray beams and the possibility to conducted single crystal diffraction in the laser heated DAC. We will discuss the different phases of the beamline development and additional high-pressure experimental techniques that will be offered once commissioning of the beamline is completed. The possibility of conducting time resolved experiments in the dynamic DAC (1) in conjunction with fast choppers will be discussed, i.e. pump and probe experiments in the sub second regime that could shade light on the nature of transient phase stages occurring during phase transition at simultaneous high-pressures and -temperatures.

References:
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Session Classification: Research focus and design of the Extreme Conditions Beamline