

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

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Powder x-ray diffraction experiments in laser heated diamond anvil cells (DAC) have been a standard experimental technique used at all 3<sup>rd</sup> 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 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 work we describe the design of the “Extreme Conditions Beamline P02.2” at PETRA III, Hamburg, Germany, that will be used to conduct both monochromatic (8-70 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 stages of the beamline development and the high-pressure experimental techniques that we like to offer once commissioning of the beamline is completed. The possibility of conducting time resolved experiments in the dynamic DAC<sup>[1]</sup> and the pulsed laser heated DAC<sup>[2]</sup> in conjunction with fast choppers will be discussed as well as the possibility to shade light on the nature of transient phase stages occurring during phase transition at simultaneous high-pressures and -temperatures.

**References:**

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"Advances in Large Facilities Techniques"  
Invited Talk