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## Resonant X-ray Diffraction at the Petra III Chemical Crystallography Beamline

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Since 2010, the joint research project “Chemical Crystallography Beamline” is working together to build up a dedicated experimental station at DESY’s PETRA III east extension in Hamburg. The partners from Freiberg contribute in particular by establishing the setup for Resonant X-Ray Diffraction methods. In addition to energy resolved photon detection and polarization analysis, this setup comprises the application of physical fields as well as temperature, which specifically covers the design and construction of a customized sample chamber for *in-situ* characterization of pyro- and piezoelectrical properties.

This chamber allows, for instance, the combination of pyroelectric measurements with the newly developed Resonant X-ray Diffraction Method RSD (Resonantly Suppressed Diffraction), which can evaluate atomic displacements in the pico-meter range. Further subjects within the sub-project are the characterization of dynamical processes and phase transformations with a focus on materials for energy conversion and storage. Respective results of recent research include on the one hand pyroelectricity in polar phases of strontium titanate  $\text{SrTiO}_3$  and the standard pyroelectric structures lithium niobate  $\text{LiNbO}_3$  and lithium tantalate  $\text{LiTaO}_3$ , and on the other hand atomic displacements in yttrium-manganese-oxide  $\text{YMn}_2\text{O}_5$  and rare-earth oxoborates  $\text{RX}_2\text{Z}_2\text{O}(\text{BO}_3)_3$  ( $R$  = rare earth, and  $X, Z$  = Ca).

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