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Exploring Phase Diagrams, Structures and Properties with the Large Volume Press at the ESRF

Tuesday, 13 September 2022 10:15 (30 minutes)

The ESRF's large-volume press beamline, ID06LVP, has been in User operation for 10 years (e.g. Guignard & Crichton, 2015). It complements the ESRF's already wide-ranging extreme conditions portfolio by offering, primarily, *in situ* angle-dispersive diffraction-based experimentation with a multi-anvil device that operates in one-and two-stage modes. Through use of independent anvils; both normal compression, with high degrees of triaxiality, and deformation data collections are possible. It operates with continuous acquisition in pressure, temperature, time space through use of a custom-built CdTe detector, allowing for rapid assessment of phase diagrams, reactions (and rates) and, under static conditions, sufficiently resolved data for structure solution and refinement. Ancillary techniques often supplement the primary diffraction measurements (conductivity, resistivity, ultrasound, imaging, *&c*); thus providing the complementarity of transport and physical properties measurements required by materials exploration in solid-state sciences. In this presentation, we highlight the evolution of the main design features of the instrument during this period of continuous User operation. We will give an overview of the current operational status as part of the ESRF's EBS and expectations for future technologies. During these, we will draw-upon data and examples from in-house testing and User operation to illustrate features and the typical uses from various fields of research.

[1] Guignard, J., Crichton, W. A. The large volume press facility at ID06 beamline at the ESRF as a high pressure -high temperature deformation apparatus. Rev. Sci. Instrum. 2015, 86, 085112.

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