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## Single Crystal Studies Elemental Systems

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Prior to 2007, the highest pressure at which full single-crystal x-ray diffraction data had been collected and refined was 50 GPa. However, building on developments at the SRS (Daresbury), we have pushed the use of such techniques first to 100 GPa on Diamond [1] and, most recently, to 145 GPa at the ESRF [2]. The use of these techniques has revealed previously unimagined structural complexity in sodium [3], and the extremely high flux at the ESRF, and the micro-focussed x-ray beams, have also enabled us to collect extremely high quality data on weakly scattering samples such as Li, N<sub>2</sub> and O<sub>2</sub>, including both high- and low-temperature studies. Representative results from all these studies will be presented, and the prospects for future such studies on Petra III will be discussed.

[1] M.I. McMahon, E. Gregoryanz, L.F. Lundegaard, I. Loa, C. Guillaume, R.J. Nelmes, A.K. Kleppe, M. Amboage, H. Wilhelm, and A.P. Jephcoat, *Proc. Nat. Acad. Sci.* 104, 17297 (2007).

[2] L.F. Lundegaard, E. Gregoryanz, M.I. McMahon, C. Guillaume, I. Loa, and R.J. Nelmes, *Phys. Rev. B* 79, 064105 (2009).

[3] E. Gregoryanz, L.F. Lundegaard, M.I. McMahon, C. Guillaume, R.J. Nelmes, and M. Mezouar, *Science* 320, 1054 (2008).

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**Session Classification:** Examples for Powder and Single Crystal Diffraction at simultaneous high-pressure and high/low-temperatures (continued)