MS17-03 **Single-Crystal Neutron Diffraction 10 GPa and Beyond.** Craig L Bull,[a] John S. Loveday[a] Richard J Nelmes[a], Hayrullo Hamidov[a], Malcolm Guthrie[a], Kazuki Komatsu[a], Matthias Gutmann[b], Maria Teresa Fernandez-Diaz
[a]*SUPA, School of Physics and Astronomy, Centre for Science at Extreme Conditions, University of Edinburgh, Mayfield Road, Edinburgh, EH9 3JZ, UK.,* [b] *ISIS Facility, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon,* [c]*Institute Laue Langevin, 6 rue Jules Horowitz BP 156, F-38042 Grenoble Cedex 9, (France)*
E-mail: craig.bull@stfc.ac.uk

The application of pressure provides a unique method of perturbing the hydrogen bond. The application of high pressure allows the hydrogen bond length to be altered cleanly and continuously within the same phase, and changing pressure can produce much larger changes in geometry than can changing temperature. We present recent developments in high pressure technology and neutron instrumentation which now make it possible to measure the changes of the proton behaviour of the hydrogen bond at hydrostatic pressures up to and beyond 10 GPa. By making use of examples of materials containing hydrogen bonds for example water, squaric acid, KDP and gas hydrates, we will demonstrate the application of these techniques and how they provide insight into the nature of the hydrogen bond at high pressure.

Keywords: hydrogen-bond; high-pressure; neutron diffraction

MS17-04 **New Scientific Opportunities with next Generation Portable Large Volume HighP/T/Stress/ Tomography Cells** Y. Le Godec[a], M. Álvarez-Murga[b], G. Bromiley[c], S. Klotz[a], M. Mezouar[b], J.P. Perrillat[d], J. Philippe[a], S.A.T. Redfern[e] and V.L. Solozhenko[f] [a]*IMPMC, UPMC, France,* [b]*ESRF, France,* [c]*University of Edinburgh, EH9 3JW, UK,* [d]*UMR5570, Lyon, France,* [e]*University of Cambridge, CB2 3EQ, UK,* [f]*LSPM-CNRS, France*
E-mail: yann.legodec@impmc.upmc.fr

We describe a recently developed portable large volume high-P/T/stress/tomography device installed at ESRF for extreme chemistry, materials and Earth sciences. The system uses the V7 type Paris-Edinburgh (PE) press. The V7 has a capacity of 450 tonnes but only a weight of less than 90 kg. The ~ 20% larger overall dimensions permit accommodation of various modules whose volume is too large to be incorporated in the "traditional" PE press:

1/ Multi-anvil module (T-cup)
The Stony Brook "T-cup system" is a miniaturised KAWAI-type apparatus which operates routinely to 25 GPa and 2500 K. Our T-cup module has been widely modified from its original design in order to accommodate optimised Sollers slits and large area CCD detectors for angle dispersive X-ray diffraction. The novel feature of this apparatus is its extreme compactness, which provides important advantages compared to conventional multi-anvil cells. We outline some recent results obtained with this new device.

2/ Rotational PE module (roPEc)
A small and portable rotational PE module (compatible with the V7 Paris-Edinburgh loading frame) has been developed, in which controlled torsional shear stresses can be applied between the opposed anvils, allowing high-P high-T measurements of samples subjected to a wide range of strain regimes. Large and variable shear stresses and strain rates can be imposed on samples held at simultaneous high P-T conditions. This roPEc module has been successfully combined with ADX and radiograph imaging in order to measure stress and strain in situ.

3/ Rotational Tomography PE module (rotoPEc)
A new rotating tomography Paris–Edinburgh cell has been recently developed in order to provide an angular access compatible with a tomographic scan (180°). These promising capabilities will provide new scientific opportunities for studies of phase transition, density, crystallization and deformation under extreme P/T/stress conditions.

Keywords: high-pressure; shear; tomography