Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

A New Way of Generating Load at Cryogenic Temperatures for Neutron Studies MATTHEW JACOBSEN, CHRISTOPHER RIDLEY, School of Engineering and Centre for Science at Extreme Conditions, University of Edinburgh, United Kingdom, OLEG KIRICHEK, PASCAL MANUEL, ISIS, Rutherford Appleton Laboratory, United Kindom, J. PAUL ATTFIELD, School of Chemistry and Centre for Science at Extreme Conditions, University of Edinburgh, United Kingdom, KONSTANTIN KAMENEV, School of Engineering and Centre for Science at Extreme Conditions, University of Edinburgh, United Kingdom — Pressure generation at cryogenic temperatures presents a problem for a wide array of experimental techniques, particularly for neutron studies due to the volume of sample required.[1] This challenge has been previously tackled by using a modified Bridgman-seal in a Paris-Edinburgh cell.[2] We present a novel design of a pressure cell in which load is generated by a bellows driven by helium gas which ensures leak-free operation of the device. The bellows is custom-designed to generate the load of 80 kN at the maximum operational gas pressure of 350 bar. For opposed anvils with 3 mm diameter working surface, for example, this load converts into an average pressure of 11 GPa across the culets. The cell has four large windows for the scattered beam and the setup allows control of pressure in a wide (P,T)-range in which helium is in gas or liquid state. The cell has been used at the WISH beamline of the ISIS Pulsed Neutron Source with sapphire anvils. The device will be presented in detail, along with pressure loading curves and initial experimental data.

[1]Bailey, I. F. (2003). Z. Kristallogr., 218(2-2003), 84-95.
[2]S. Klotz, B. Padmanabhan, J. Philippe, and T. Strässle, High Pressure Res. 28, 621 (2008).

Matthew Jacobsen
School of Engineering and Centre for Science at Extreme Conditions,
University of Edinburgh, Edinburgh, United Kingdom

Date submitted: 14 Feb 2013 Electronic form version 1.4