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New pressure cell for ultrasonic measurements MICHAL KEPA, ANDREW HUXLEY, KONSTANTIN KAMENEV, University of Edinburgh — Ultrasonic interferometry at high pressure remains a technical challenge as the small sample space requires the application of very high-frequency ultrasound [1]. Here we present the design of a new cell developed specifically for ultrasonic measurements of single crystals at low temperatures (2K) and high pressures (5GPa). The design allows greater sample space (compared to a conventional diamond anvil cell) and simultaneous measurement of ultrasonic attenuation and velocities. Coupling the fine transducers to spherical sapphire anvils reduces background and enables different polarizations of the ultrasonic wave to be measured at the same pressure and temperature conditions. The results are used to deduce the elastic, electronic and magnetic properties of a crystal. The finite element analysis of the cell together with the pressure calibration curves and test data taken on UGe_2 are presented.

[1] Jacobsen S. D. et al. A gigahertz ultrasonic interferometer for the diamond-anvil cell and high-pressure elasticity of some iron-oxide minerals. In: J. Chen et al. (Eds.) Advances in High-Pressure Technology for Geophysical Applications, Elsevier (2005).

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