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High Temperature Studies of Hydrogen and Deuterium at Extreme Pressures ROSS HOWIE, PHILIP DALLADAY-SIMPSON, CHRISTOPHE GUILLIAME, EUGENE GREGORYANZ, The University of Edinburgh, GREGORYANZ ET AL. TEAM — Melting characteristics is an essential diagnostic in studying the properties of the interactions within a material as well as differences between the solid and liquid states. Hydrogen despite being a simple system displays immense complexity and rich physics when under extreme pressures [1]; therefore it is important to broaden our understanding of quantum systems by studying hydrogen in extended pressure-temperature regimes. Previous experimental data alludes to a maximum in the melting curve [2], which has major implications for the existence of a ground state liquid at higher pressures [3]. Recent experimental advances have allowed us to probe melting in a new region of pressure-temperature space previously inaccessible due to the chemical reactivity of H_2. Through a series of high temperature Raman spectroscopic experiments we have investigated the melting curve of hydrogen and deuterium in excess of 1000K within the megabar range, conditions previously unattainable. This study not only will show the first experimental melting data on deuterium but also allow for much needed isotopic comparisons in the high temperature regime.

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[3] E. Babaev *et al. Nature*, **431**, 666, 2004.

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