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Hot-dense hydrogen study up to 300 GPa CHANG-SHENG ZHA, Carnegie Institution of Washington — Hydrogen study under extreme pressure-temperature conditions has fundamental importance for the development of condensed physics. The prediction of insulator to metallic state transition at sufficient high pressure has been a long-standing open question for the high pressure physics community. Recently, more experimental and theoretical interests were focused on the hot-dense state of hydrogen. A numerous investigations indicated a turnover melting line with a maximum point around ˜100 GPa. First-principle theoretical models indicate that the metallization could be a liquid-liquid transition just above the melting line. Experiments for these studies were mostly conducted in shock compression or pulsed laser heating in static compression resulted in large controversy observations. Hydrogen study also has been one of the engines driving the advance of static pressure-temperature technologies. New developments in hydrogen study have brought static pressure generation and signal probing technique into 300 ˜400 GPa range, leading to more new phases found. New experimental results using static pressure-temperature DAC techniques demonstrate that hydrogen has much more complicated phase behaviors at multiple megabar pressure range than that expected previously.

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