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Pressure-Induced Interactions in Silane-Hydrogen TIMOTHY STROBEL, MADDURY SOMAYAZULU, RUSSELL HEMLEY, Carnegie Institution — We report pressure-induced formation of a novel molecular silane-hydrogen compound with intermolecular interactions unprecedented for hydrogen-rich solids. A complex H2 vibron spectrum with anticorrelated pressure-frequency dependencies and a striking H-D exchange below 10 GPa reveal strong and unusual attractive interactions between SiH4 and H2 and molecular bond destabilization at remarkably low pressure. Structural analysis from single crystal X-ray diffraction data, hydrogen rotational dynamics from low-temperature Raman measurements, H-D isotopic exchange measurements and similarities to other molecular hydrides will be discussed. The unique features of the observed SiH4(H2)2 compound suggest a new range of accessible pressure-driven intermolecular interactions for hydrogen-bearing simple molecular systems and a new approach to perturb the hydrogen covalent bond.

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