SILICON-PHOSPHORUS BONDING: LABORATORY DETECTION OF $HPSiH_2$ EMPLOYING HIGH RESOLUTION MICROWAVE SPECTROSCOPY

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$HPSiH_2$, the ground state isomer on the H_3SiP potential energy surface, has been detected by means of Fabry-Pérot FT microwave spectroscopy. The laboratory search has been guided by theoretical structure calculations performed at the CCSD(T)/cc-pwCVQZ level of theory corrected for zero-point vibrational effects at the CCSD(T)/cc-pV(T+*d*)Z level. A mixture of silane and phosphine in a discharge supersonic molecular beam has been used to produce the new species, allowing the detection of the three lowest K_a=0 rotational transitions. The discovery has been confirmed by successful identification of the same transitions of $HP^{29}SiH_2$, $HP^{30}SiH_2$, and $DPSiD_2$, at precisely the expected frequency shifts. The presence of other Si and some P bearing molecules in astronomical sources suggests, that this molecule is a plausible candidate for radio astronomical detection.