DIRECT MEASUREMENT OF THE N = 0 $\rightarrow$ 1 TRANSITION OF SH^+ ($X^3\Sigma^-$) BY VELOCITY MODULATION SPECTROSCOPY

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The N = 0 $\rightarrow$ 1 transition of SH^+ in its $^3\Sigma^-$ ground electronic state has been recorded with a newly-built spectrometer which utilizes sub-millimeter direct absorption/velocity modulation techniques. This molecular ion was created in an AC discharge of H_2S and argon, or CH_3SH in argon. The four strongest hyperfine lines of the N = 0 $\rightarrow$ 1 transition were measured, three near 526 GHz arising from the J = 1 $\rightarrow$ 2 spin component, and one near 346 GHz originating from the J = 1 $\rightarrow$ 0 component. These data were used to refine the molecular constants of SH^+, in particular the fine structure parameters. Both the transition frequencies and derived constants are in good agreement with previous laser magnetic resonance (LMR) data. This study has resulted in very accurate rest frequencies for SH^+, which will aid in conducting interstellar searches for this ion.