THE RADIO SPECTRA OF SICCH, SICN AND SiNC

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Three new silicon-bearing radicals of astrophysical interest, SiCCH, SiCN and SiNC, were detected in a laboratory discharge in their $X^2\Pi$ ground states by Fourier transform microwave and direct absorption millimeter-wave spectroscopy. Well-resolved Λ–doubling was observed in both fine structure components, and hyperfine structure was observed in the low rotational transitions of the $^2\Pi_{1/2}$ ladder. With the spectroscopic constants derived from the laboratory measurements, the spectra of the three radicals can be calculated to an uncertainty of less than $0.1\ \mathrm{km\ s^{-1}}$ in equivalent radial velocity over the entire range of interest to radio astronomers. SiCN with a dipole moment of 2.9 D is probably the most promising of the three for astronomical discovery.