Nonlinear Pressure Shifts of Rubidium in Inert Gases  BART MCGUYER, YUAN-YU JAU, WILLIAM HAPPER, Princeton University — Vapor-cell atomic frequency standards are based on the hyperfine (microwave) magnetic-resonance frequencies of optically pumped alkali-metal atoms in inert buffer gas. Through the hyperfine-shift interaction, buffer gas induces pressure shift and broadening in these microwave resonances. Previous work uncovered nonlinear dependence in the pressure shifts of $^{87}$Rb and Cs atoms to the pressure of buffer gases Ar and Kr, but not He or N$_2$. The nonlinearity is thought to result from alteration to the hyperfine-shift interaction due to temporary van der Waals molecules formed between alkali-metal and buffer-gas atoms. We investigate nonlinear pressure shifts for both isotopes of Rb, $^{87}$Rb and $^{85}$Rb. This study will test the current model for nonlinear pressure shifts of alkali metals in inert gases.