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Spectroscopy, buffer gas cooling and radiation pressure slowing of AlF molecules STEFAN TRUPPE, SILVIO MARX, SEBASTIAN KRAY, MAXIMILIAN DOPPELBAUER, SIMON HOFSAESS, H. CHRISTIAN SCHEWE, Fritz Haber Institute of the MPG, BORIS SARTAKOV, General Physics Institute, Russian Academy of Sciences, GERARD MEIJER, Fritz Haber Institute of the MPG — The aluminum monofluoride molecule (AlF) is an excellent candidate for laser cooling and magneto-optical trapping with high density. We present spectroscopic results necessary for laser cooling and trapping experiments and show first results on buffer gas cooling and radiation pressure slowing of AlF. We determine the energy levels in the $\mathrm{X}^1\Sigma^+, v = 0$ state and within each Ω-manifold in the $\mathrm{a}^3\Pi, v = 0$ state with a relative accuracy of a few kHz and the hyperfine splitting in the $\mathrm{A}^1\Pi, v = 0$ state with a few MHz. We also record laser excitation spectra in electric fields up to 150 kV/cm to determine the electric dipole moments in all three states with high accuracy. To determine the number of photons the AlF molecules scatter from a single laser we measure the transition strength of the $\mathrm{A}^1\Pi, v' = 0 \leftarrow \mathrm{a}^3\Pi, v'' = 0$ and $\mathrm{A}^1\Pi, v' = 0 \leftarrow \mathrm{X}^1\Sigma^+, v'' = 1$ band relative to the $\mathrm{A}^1\Pi, v' = 0 \leftarrow \mathrm{X}^1\Sigma^+, v'' = 0$ band. We also characterize a cryogenic buffer gas beam of AlF and present first results on radiation pressure slowing using a counter-propagating laser tuned to the Q(1) line of the $\mathrm{A}^1\Pi, v' = 0 \leftarrow \mathrm{X}^1\Sigma^+, v'' = 0$ band near 227.5 nm.

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