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Toward Quantum Computing with Polar Molecules¹

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The unique properties of polar molecules make them potentially very attractive for quantum information processing. The rotational degree of freedom gives such molecules large polarizability at DC and microwave frequencies, enabling strong couplings between distant molecules; at the same time, rotationally excited states have very long intrinsic lifetimes, enabling storage of information. In this talk I will discuss evolving ideas for possible architectures to take advantage of these properties. In all cases, the ability to cool and trap polar molecules at high phase space density is a necessary step. I will also discuss our experimental progress towards this goal.

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