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Cold Charged Radium¹

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Radium is the heaviest alkaline earth element, and thus when ionized it is isoelectronic to established trapped ion systems, such as Ca^+ . Therefore the entire toolbox developed for trapped ion quantum information science and optical clocks is available to radium. The radium atom is appealing because its high mass and an octupole deformed nucleus combine to make it sensitive to new physics, especially when included in molecules. The mass and favorable wavelengths of the radium ion also make it a promising optical clock candidate. We discuss laser cooling and spectroscopy of the radium ion, production of radium-based molecular ions for addressing the baryon asymmetry problem, and work towards a radium ion optical clock.

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