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Precision Spectroscopy of Trapped Radium Ions G.S. GIRI, J.E. VAN DEN BERG, D.J. VAN DER HOEK, S. HOEKSTRA, K. JUNGMANN, W. KRUITHOF, M. NUNEZ-PORTELA, C.J.G. ONDERWATER, B. SANTRA, R.G.E. TIMMERMANS, O.O. VERSOLATO, L.W. WANSBEEK, L. WILLMANN, H.W. WILSCHUT — A single trapped radium ion is an ideal candidate for high precision experiments. Atomic parity violation can be measured in a single Ra^+, enabling a precise measurement of the electroweak mixing angle (Weinberg angle) in the Standard Model of particle physics. The Weinberg angle can be measured via a determination of the light shift in the forbidden $7^2S_{1/2}$-$6^2D_{3/2}$ transition in a single trapped Ra^+. In this alkali like system the sensitivity to parity violating weak interaction effects is 50 times higher than that in Cs, where the best such experiments were performed to date. We have succeeded in the production of a series of short lived radium isotopes. The isotopes produced were stopped and thermalized to Ra^+ in a Thermal Ionizer, mass separated in a Wien filter, gas-cooled in a Radio Frequency Quadrupole and subsequently trapped as a cloud in a linear Paul trap. Laser spectroscopy of the trapped radium ions has been performed. The results on hyperfine structures, isotope shifts and lifetimes are important input to test the accuracy of atomic theory, the precision of which is indispensable for extracting the Weinberg angle. The experimental set up to laser cool and trap a single Ra^+ is underway.

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