Search for Parity and Time Reversal Violation in Atoms and Molecules

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Precise measurements of discrete symmetry violations in atomic and molecular systems enable stringent tests of the Standard Model in Particle Physics. Possible extensions to it, which were proposed in order to provide explanations for reliably observed, yet fully unexplained facts, such as the nature of discrete symmetry violations or the number forces and number of particle generations. We will discuss progress in a project aiming to obtain a most precise value for the Weinberg angle ($\sin^2 \theta_W$) from precise spectroscopy on single trapped Ba^+ ions. This will include auxiliary measurements such as precise atomic lifetime and precision frequency determinations in order to scrutinize atomic theory, the reliability of which is pivotal for the success of the approach to limit beyond the Standard Model physics. Searches for permanent Electric Dipole Moments on Nuclei and on the electron in systems like the ^{129}Xe atom and the BaF molecule enable with a rather different approach to set limits on speculative theories. Two such experiments will be discussed in the framework of ongoing EDM searches on various systems.