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Title

New Experiment for the First Direct Measurement of Positronium Hyperfine Splitting with sub-THz Light

Source

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Abstract

Positronium is an ideal system for the research of Quantum Electrodynamics (QED), especially for QED in bound state. The discrepancy of 3.9 was found recently between the measured HFS values and the QED prediction of $O(\alpha^3)$. It might be due to the contribution of unknown new physics or systematic problems in the all previous measurements. We propose a new method to measure HFS directly and precisely. A gyrotron, a novel sub-THz light source is adopted with a Fabry-Perot cavity with high finesse and an efficient transportation system in order to obtain sufficient radiation power at 203 GHz. The present status of the optimization studies and the current design of the experiment are described. (6 References).