



Physics Colloquium

Thursday, 17 October 2019 | 17:00 – 18:00, Seminar Room, 3rd floor

Test fundamental atomic physics using precision laser spectroscopy

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ABSTRACT

Laser spectroscopy as a precision measurement approach is used to explore several fundamental physics phenomena that lay the foundation for today's quantum theory, such as QED and symmetry violation. Firstly, the progress on the spectroscopy of the hydrogen-like atomic bound system will be reported, particularly on the finding of the unexpected smaller proton charge radius of proton using muonic hydrogen. It is now called "proton size puzzle". Secondly, the system violations act as stringent test to the Standard model. The measurement of the parity non-conservation (PNC) in atomic systems, which take the route of high precision and low energy, is a crucial complementary to the high energy experiment. Several newly developed spectroscopy techniques, such as cavity enhancement and electromagnetic induced transparency (EIT), can be utilized to improve the latest measurement with atomic cesium that has been established a twenty years ago. The ongoing project on atomic thallium PNC shows a high potential of significant improvement.

References

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2. Pohl, R. et al. Laser spectroscopy of muonic deuterium. *Science* 353, 669–673 (2016).
3. Lien, Y.-H. et al. Absolute frequencies of the Li-6, Li-7 2S S-2(1/2) \rightarrow 3S S-2(1/2) transitions. *Phys. Rev. A* 84, – (2011).
4. Pohl, R. et al. The size of the proton. *Nature* 466, 213–216 (2010).