THEORETICAL PHYSICS SEMINAR

Title: Developing of an optical clock using trapped Ytterbium-ion

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Date/Time/Venue: 10th September (Thursday)/4:00 PM/ Room No. 469

ABSTRACT

Increasing accuracies of the atomic clocks have wide range of applications in various fields ranging from sophisticated technologies to precision experiments. Now-a-days the state-of-the-art atomic clocks based on forbidden optical transitions has achieved an accuracy of ~10-18, which means 1 s inaccuracy over the age of the universe. Recently we have started developing an atomic clock that will operate at the |2S1/2; F=0, mF=0> - |2F7/2; F=3, mF=0> octupole transition at wavelength 467 nm of a single trapped and laser cooled ytterbium-ion. We will use an electrodynamic (Paul) trap of the end cap geometry for trapping a single ion and perform precision frequency measurements. We have fabricated a prototype of the trap using the design parameters that we have opted through numerical simulations. We have also estimated systematic uncertainties that are expected from our experiment. As of now, we have designed the ion trap, the ultra-high vacuum chamber and optics associated to the laser cooling. We have already fabricated some sub-components of the experiment such as electromagnetically shielded helical resonator for delivering the radio frequency to the trapping electrodes, atomic oven for producing nearly collimated ytterbium atomic beam and various electronic modules. Current status of the experiment and plans will be discussed.

All are welcome to attend