

Nuclear and particle physics with cold ytterbium and Rydberg atoms

Thursday, 14 March 2024 14:30 (30 minutes)

“Precision spectroscopy of atoms has reached as high accuracy as 18 digit precision. This remarkable accuracy has opened avenues for investigating nuclear and particle physics, which were conventionally explored with high energy accelerators. Such high precision measurements are sensitive to subtle effects of high energy phenomena that may manifest in the low energy system. Alternatively, atoms can serve as a sensor with high sensitivity beyond existing detectors.

In this talk, I will describe two examples of such applications of atomic physics to nuclear and particle physics. First, I discuss our recent experimental work on the precision spectroscopy of the new clock transition at 431 nm in Yb. We completed the table of isotope shifts for stable isotopes and performed various analyses based on it, including the assessment of nuclear charge radii and a search for new bosons mediating the force between an electron and a neutron. In the second half, I will describe my recent theoretical proposal to improve the position resolution of a charged particle tracker by two orders of magnitude using an array of Rydberg atoms.”

Presenter: KAWASAKI, Akio (NMIJ/AIST)

Session Classification: Oral