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Electron Scattering - Hofstadter's experiment for short-lived nuclei -

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Electron scattering is known to be the best probe for structure studies of atomic nuclei. It has been consistently playing a key role for our understanding of the internal structure of stable nuclei.

We have proposed a novel internal-target scheme, SCRIT (Self-Confining RI Target) [1,2], which enables us to realize never-yet-performed electron scattering for short-lived nuclei. Feasibility studies using stable Cs ions demonstrated that this scheme works [3], and a luminosity of higher than 10^{26} /cm²/s was achievable with only 10^6 ions [4] with the trapping time of 50 ms. Note that the luminosity of an order of 10^{26-27} /cm²/s is required to perform the Hofstadter's experiments, elastic electron scattering, for exotic nuclei, where their charge form factor are determined.

We are now constructing an world's-first electron-scattering facility for short-lived nuclei in RIKEN RI Beam Factory.

The facility consists of an electron accelerator, and ISOL system and an electron detection system. The accelerator has been already installed and commissioned. The first collision of electrons and short-lived nuclei will take place in 2014.

In my talk, I will discuss on physics motivation of electron scattering for short-lived nuclei, the brand-new technique and the new electron scattering facility under construction. In addition, I will briefly touch upon future perspectives of structure studies of exotic nuclei by electron scattering with higher luminosities.

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