

Title : Nuclear Studies with Antiprotons

Abstract

The aim of our collaboration is to understand decays of anti-protonic atoms detected with the emission of several π mesons. It is motivated by the PUMA experiment at CERN which will study decays of these atoms built from radioactive nuclei. The results are expected to provide the difference of neutron and proton radial density distributions aiming to track down the onset of neutron skin as the neutron number increases.

In the seminar I will discuss elementary process $N\text{-}\bar{N} \rightarrow \text{multi-}\pi$ reactions in free space and on the nuclear surfaces, final state interactions and the charge distribution of these mesons. The latter will allow experimentalists to study the neutron excess in the surface regions with a higher sensitivity to the moments of the neutron density distribution. An important point in the analysis is the relative rate of antiproton annihilations on neutrons and on protons. This calls for improving $N\text{-}\bar{N}$ interaction models which we have shown in recent studies to differ significantly among themselves both at low- and intermediate- energies. Ultimately, the framework which we are developing will be used to analyse the PUMA measurements and to predict properties of highly unstable antiproton-nucleus states.