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Probing Nucleonic Densities with Antiprotons - the PUMA experiment

Tuesday 9 April 2024 09:35 (35 minutes)

PUMA (antiProton Unstable Matter Annihilation) is a new experiment at CERN since 2021. It aims to utilise antiprotons to probe the nucleonic composition of the tail of the nuclear density distribution of both stable and exotic nuclei. Antiprotons are trapped with the ions of interest: after formation of antiprotonic atoms, the antiprotons will annihilate on the nucleus's surface with a proton or a neutron. This process yields annihilation products whose total electric charge allows to reconstruct the isospin distribution and thus grants access to a new observable: the neutron-to-proton ratio. These insights can provide a new perspective for investigating quantum phenomena such as nuclear halos and neutron skins. In order to apply this technique on exotic nuclei which exhibit these phenomena, PUMA aims to transport up to one billion antiprotons from the AD (Antiproton Decelerator) to the ISOLDE (Isotope Separator On-Line Device) facility in a transportable trap. In this talk, the motivations of PUMA at AD and the objectives before and after LS3 will be presented. Furthermore, an overview of the current progress of the installation and commissioning of PUMA at AD will be given.

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