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Status of the Anti Deuteron Helium Detector (ADHD) project

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The observation of GeV and sub-Gev anti-deuteron in the cosmic ray flux, could be a very strong signature of dark matter annihilation in our galaxy.
Our project, called ADHD (Anti Deuteron Helium Detector) aims to study the signatures offered by an high pressure He target where anti-deuterons can be captured by He atoms.
The exotic He atoms produced by stopping anti-protons/anti-deuterons in the gas are lasting for tens of microseconds before the annihilation.
This meta-stability is an unique (and well measured) feature for the He target that is not expected/observed for other target nuclei.
The scintillation properties of gaseous He allow for a prompt signal of a charge particle entering the detector active volume.
In the case of anti-proton or anti-deuteron the characteristic delayed annihilation signal produces a distinctive signature to identify the antimatter nature of the stopping particle.
The amplitude and the topological features of the delayed signal makes possible to separate anti-deuterons from anti-protons.
Perspectives for a possible space borne detector and the status of the characterization of a 200 Bar scintillating He detector prototype in the INFN-TIFPA laboratory will be discussed.

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