

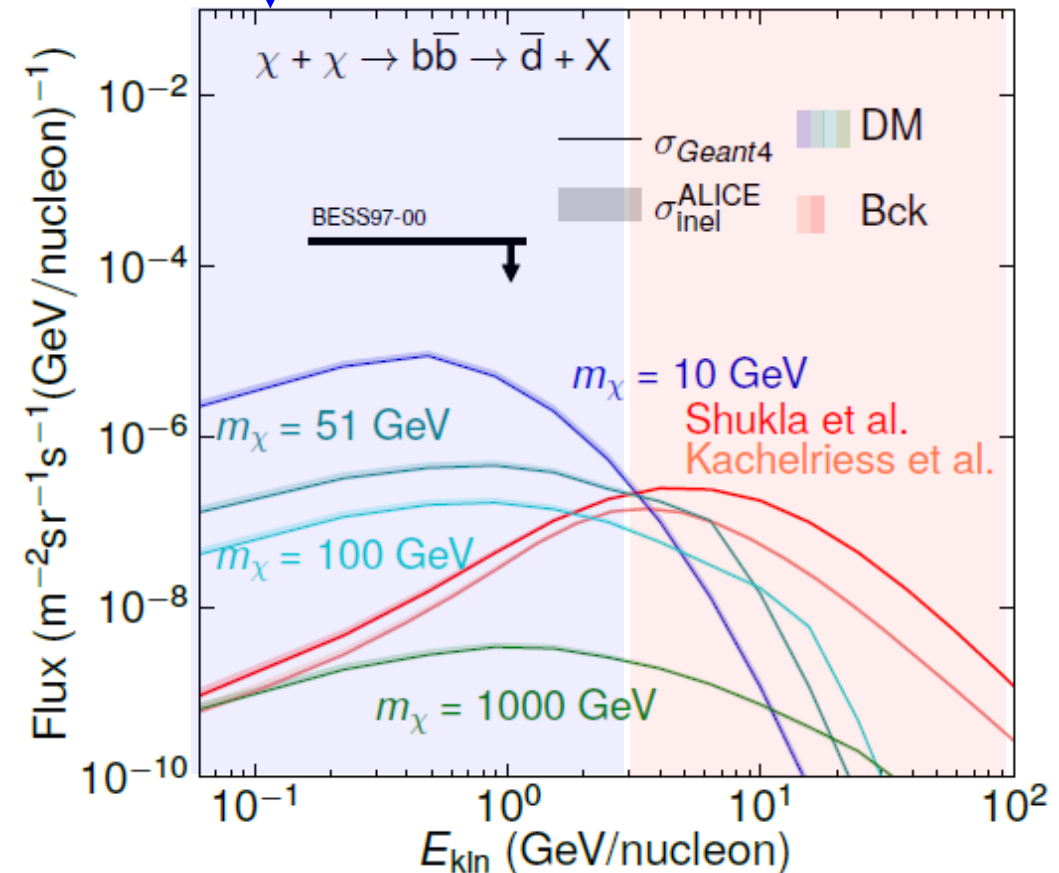
ANTIDEUTERONS IN COSMIC RAYS

WHY ANTIDEUTERONS IN COSMIC RAYS ARE INTERESTING?

- They don't have any astrophysical origin
- They can be produced only in collisions in the Galaxy between propagating Cosmic Rays (projectiles) and the Interstellar Medium (target)
- Any excess observed in Cosmic Rays data can be a signal of new physics (such as Dark Matter)

Low kinetic energy range -> **Dark Matter antideuteron** can be distinguishable from collisional background

Higher kinetic energy range -> **Collisional antideuteron** dominate the primary component

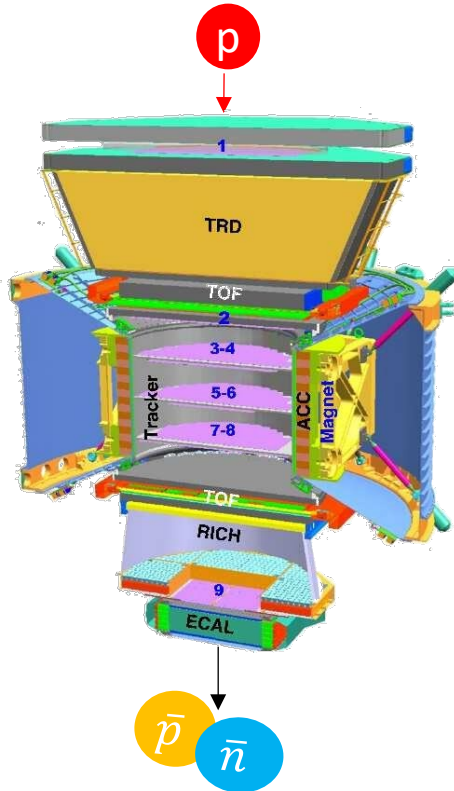


Serksnyte et al. Phys. Rev. D 105, 083021 (2022)

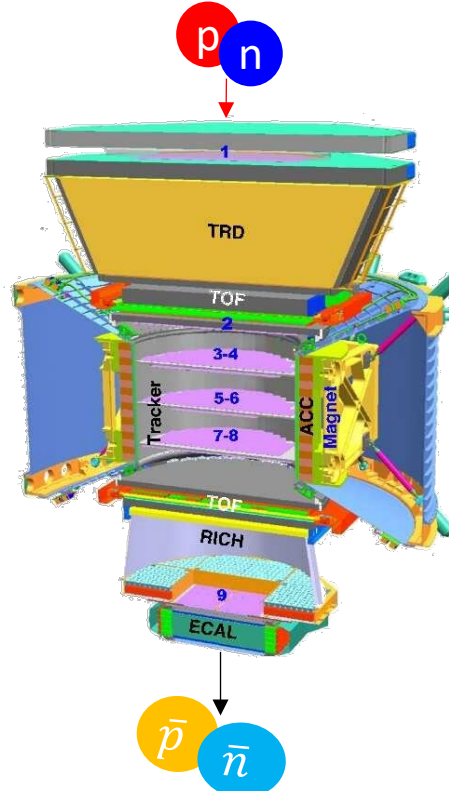
SEARCHING FOR ANTIDEUTERONS IN AMS-02 WITH MACHINE LEARNING

Antideuteron are very rare particles in Cosmic Rays (we expect to see in AMS-02 only few events).

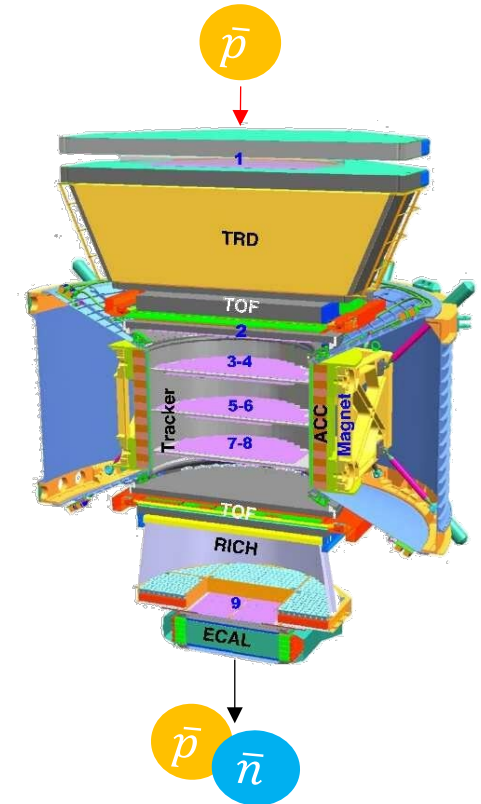
More abundant particles can mimic an antideuteron signal in the AMS-02 experiment. **We are using classifiers to reject all these backgrounds up to the precision required.**



Antideuteron can be misidentified proton
(required 1 over 10^9 identification power)



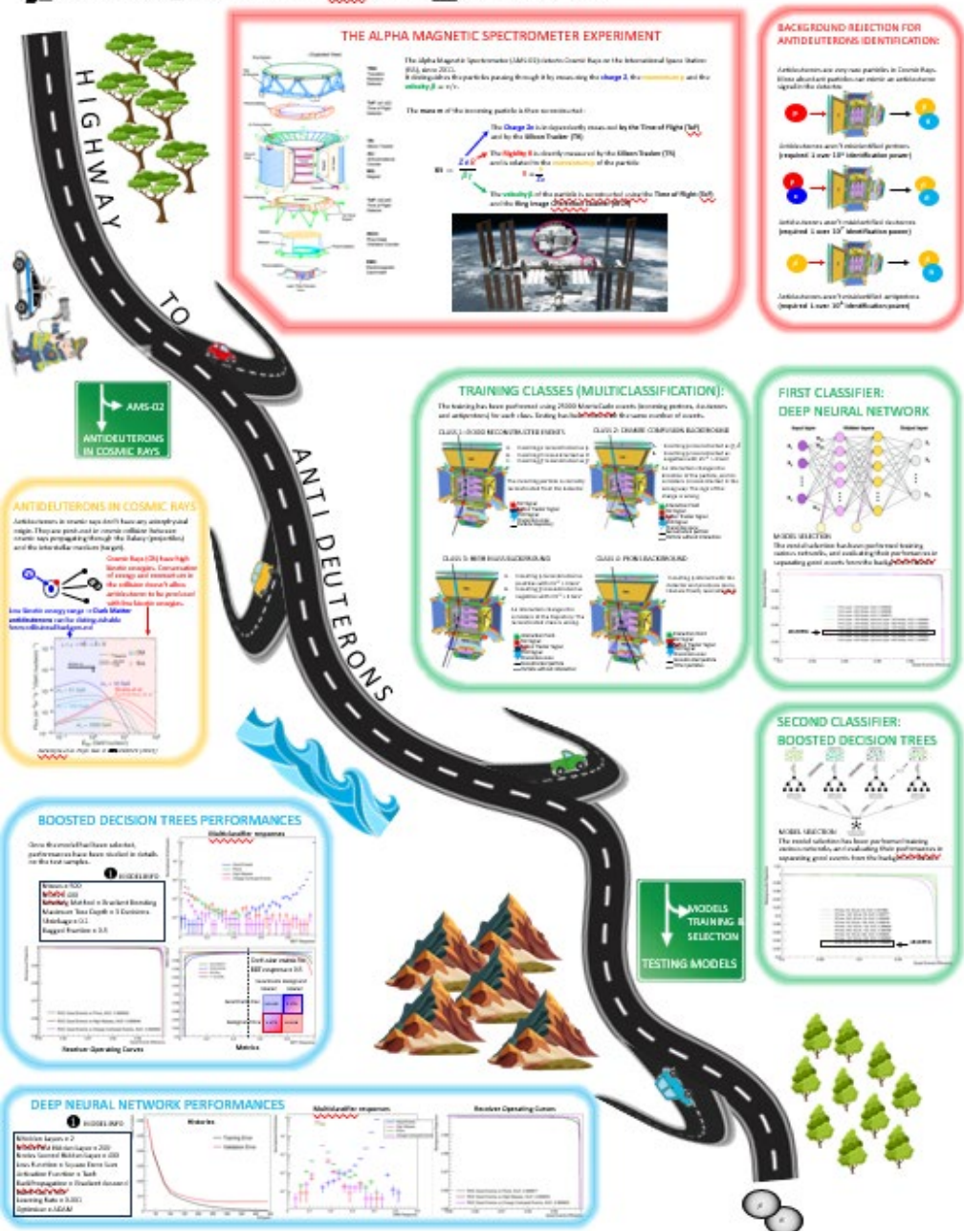
Antideuteron can be misidentified deuteron
(required 1 over 10^7 identification power)



Antideuteron can be misidentified antiproton
(required 1 over 10^4 identification power)

ML techniques to search for antideuterons with AMS-02 on the International Space Station

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I'M WAITING FOR YOU.
COME AND SEE MY POSTER IN POSTER
SESSION B!



IF YOU HAVE ANY QUESTION, FEEL FREE TO ASK ME!!



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Francesco D'Angelo – EiCAIFCon 2025, Cagliari – Flash Talk