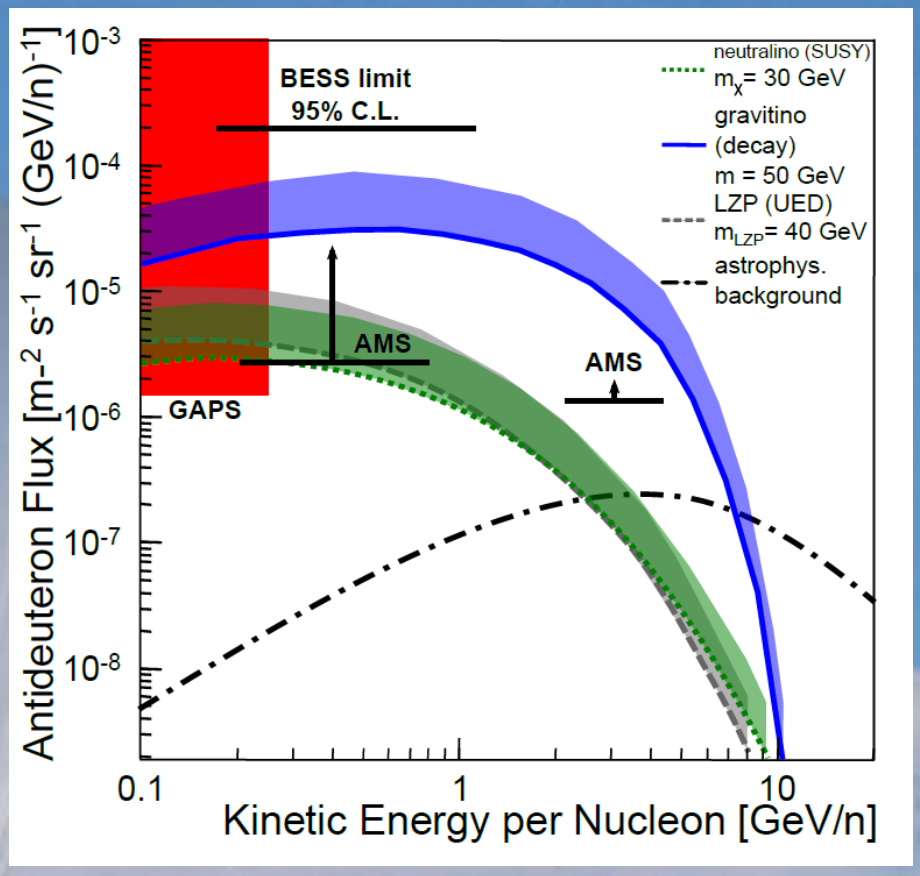
THE GAPS EXPERIMENT FOR DARK MATTER EXPLORATION

The balloon-borne experiment GAPS will fly in 2021 from Antartica and will allow either to detect the first clear signals from dark matter or to pose stringent limits on current theoretical models.

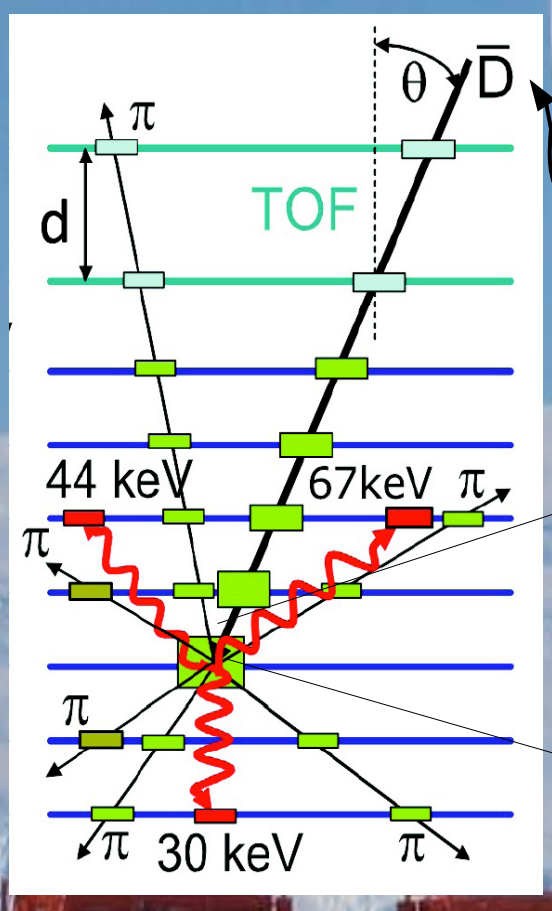
Many experimental evidences and theoretical predictions suggest a large presence of dark matter (DM) in our universe, about 25% of the total budget. The nature of DM is still unknown. Its identification is one of the major challenge in the modern physics.

Detection of DM annihilation products in the cosmic radiation could be a smoking gun. DM annihilation or decay can produce an antideuteron signal that is orders of magnitude above the background

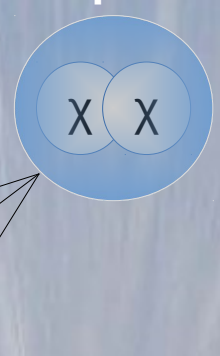
Antideuteron flux expected from different models of DM annihilation together with GAPS detection sensitivity



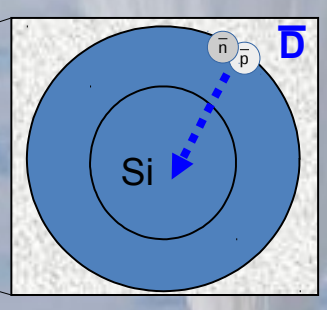
X-rays from de-excitation and annihilation star from annihilation



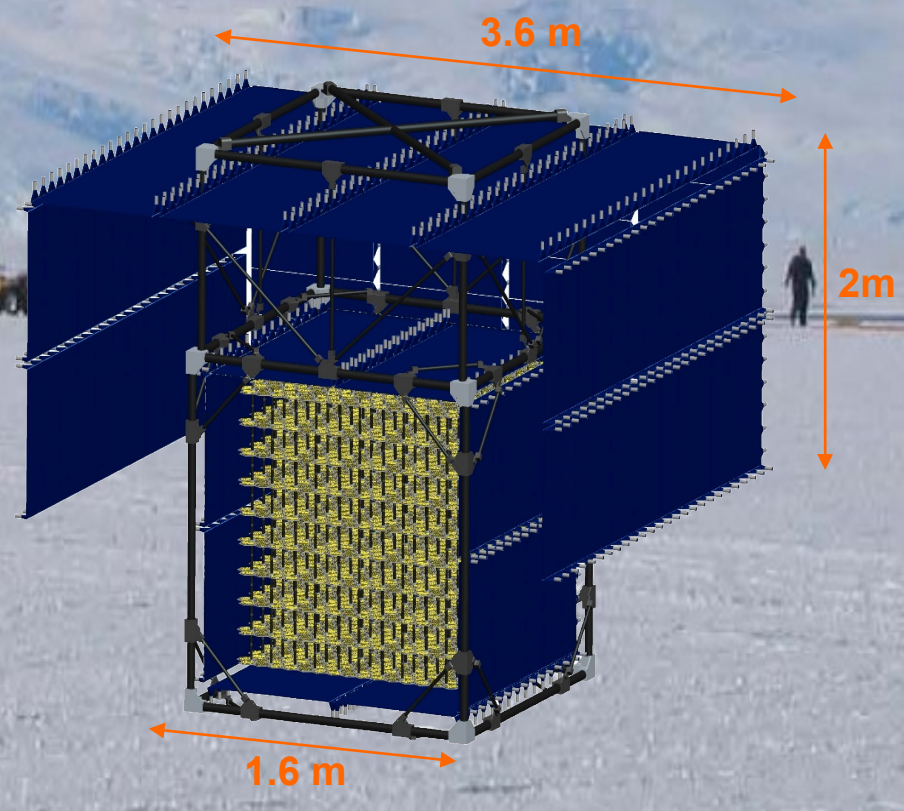
DM annihilation in space



Exotic nucleus formation



GAPS with ten planes of semiconducting Si(Li) strip detectors, surrounded by a plastic scintillator time-of-flight system will be the biggest cosmic-rays detector.



GAPS, with innovative detection technique based on creation, de-excitation and annihilation of exotic nucleus, will provide either the first detection of cosmic ray $\bar{D}$ or upper limits yielding harsh constraints on viable DM models.

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