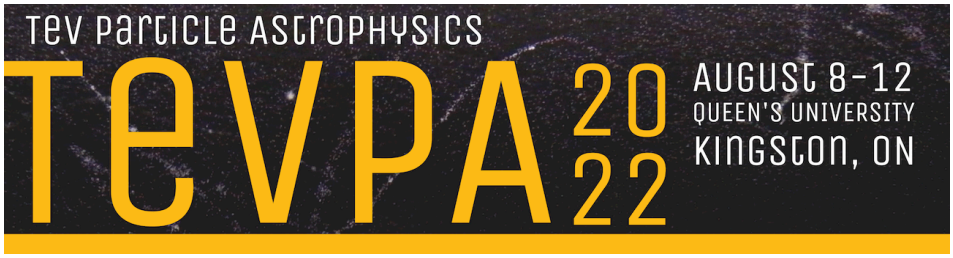

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Isotopic composition of cosmic rays with the HELIX balloon project

Tuesday 9 August 2022 14:20 (20 minutes)

Galactic cosmic ray nuclei have been measured at the GeV and TeV scale, confirming a diverse set of elemental species. These measurements heavily impact our understanding of both Galactic accelerator candidates and cosmic ray propagation. Light cosmic ray isotope abundances deliver a crucial and independent measurement on the latter. Long-lived unstable nuclei such as beryllium-10 provide a unique cosmic ray lifetime measurement, related to the size of the propagation halo in the Milky Way. I will present the High Energy Light Isotope eXperiment (HELIX), a balloon-borne magnet spectrometer that directly measures a cosmic ray' s charge, magnetic rigidity, and velocity to identify the isotope. A high-precision drift chamber tracker in a 1 Tesla magnetic field is used for rigidity measurements and time-of-flight scintillator paddles are used for charge measurements, as well as velocity at lower energies. At higher energies, velocity is measured with an aerogel-based ring-imaging Cherenkov detector. For the sought-after beryllium isotope measurements, HELIX will detect hundreds of events in the energy range of 0.2 GeV/n to 3 GeV/n in a single Antarctic Long Duration Balloon flight. I will present an update and overview on the payload including science goals and possible plans for a first launch.

Collaboration name

HELIX - High Energy Light Isotope eXperiment

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