Canadian Association of Physicists
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Contribution ID: **3829** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Metrology of the High Energy Light Isotope eXperiment (HELIX)

Monday, June 19, 2023 2:45 PM (15 minutes)

HELIX, the High Energy Light Isotope eXperiment, is a balloon-borne payload designed to measure the isotopic abundances of light cosmic ray nuclei. Precise measurements of the 10Be nuclear isotope from 0.2 GeV/n to 10 GeV/n will help study propagation processes of cosmic rays. These measurements will allow the refining of propagation models, critical for interpreting excesses and unexpected fluxes reported by several space-borne instruments in recent years. Rare light isotopes will be observed by HELIX with the first in a series of long duration balloon flights in the upcoming year. The instrument will undergo several tests and phases during its commissioning period during which it may be deconstructed and rebuilt. Knowing the position of components following each assembly is important to the measurements of various detectors. The metrology of HELIX was thus studied to provide knowledge of the distances between specified points and planes of the experiment payload.

A Total Station, a device that provides precise optical measurements in surveying and construction, was used to create a position-tracking system for HELIX. This study tested the measurement protocol with various student-designed rigs using retroreflective dots as targets. The retroreflectors have been placed on the experimental payload and are now ready for use in virtual geometry reconstruction. The metrology procedure and code produced through this project will serve as a local positioning system for HELIX components and the output points will be used to update the geometry of the detectors in simulations.

Keyword-1

Cosmic Rays

Keyword-2

Balloon Experiment

Keyword-3

Metrology

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