Contribution ID: **544** Type: **Poster**

GALPROP framework for propagation of Galactic cosmic rays and associated diffuse emissions

We are reporting about recent updates to the GALPROP framework for propagation of Galactic cosmic rays and associated diffuse emissions. GALPROP is a comprehensive interpretation package, combining the results of individual measurements in physics and astronomy spanning in energy coverage, types of instrumentation, and the nature of detected species. Its range of physical validity extends from sub-keV–PeV energies for particles and from 10^{-6} eV (μeV)–PeV for photons. GALPROP has 26+ years of development behind it, it is continually updated to keep up with ever increasing amount and precision of experimental data. GALPROP development is supported by NASA grants and is free for the community. It is an open source code, which is extensively used by many high-profile collaborations, such as Planck, Fermi-LAT, AMS-02, HAWC, Voyager 1, 2, ACE-CRIS, and by 1000s of other researchers for interpretation of their data and for making predictions. The new features of version 57.2, to be released in the fall of 2025, include: (i) the AAfrag 2.01 interpolation package for Monte Carlo results on secondary production in hadronic interactions is now incorporated into GALPROP and can be called upon appropriate selection of input parameters. It includes new options for calculation of secondary $e^{\pm}$, $\bar{p}$, p, γ-rays, and ν. The spectra and skymaps for different neutrino flavors can be calculated individually or combined. The beam+target combinations for production of secondary species now include p+A, A+p, and He+He, where A=H-Ni. AAfrag 2.01 provides the results for A=H, He, C, Al, Fe, while GALPROP includes interpolation/extrapolation for other nuclei species. (ii) Functionality to use inhomogeneous gas and dust distributions for the cosmic ray spallation and secondary production. Calculation of secondary emissions (γ-rays and ν) have options to use these models. (iii) New options for 3D Galactic magnetic field models by Unger-Farrar (2023) and Korochkin-Semikoz-Tinyakov (2024). (iv) The GALPROP self-installer now requires a minimum of system tools (only compilers, cmake, and autotools). It has been updated for compatibility with latest releases of RockyLinux and OSX.

Collaboration(s)

Authors: MOSKALENKO, Igor; PORTER, Troy; JÓHANNESSON, Guðlaugur

Presenter: MOSKALENKO, Igor

Session Classification: PO-1

Track Classification: Cosmic-Ray Direct & Acceleration