

## CRPropa 3.2 - a public framework for high-energy astroparticle simulations

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In this contribution, we introduce CRPropa 3.2, a Monte Carlo framework revolutionizing the simulation of (ultra-)high-energy particle propagation in the Universe. Encompassing cosmic rays, gamma rays, electrons, and neutrinos across a vast energy spectrum, from ZeV to GeV for gamma rays and electrons, and TeV for cosmic rays and neutrinos, CRPropa 3.2 represents a significant leap towards a universal multi-messenger platform. Noteworthy enhancements include extensions for simulating cosmic-ray acceleration and particle interactions within astrophysical source environments, a comprehensive Monte Carlo treatment of electromagnetic cascades, refined ensemble-averaged Galactic propagation, and substantial performance improvements in cosmic-ray tracking through magnetic fields. The framework's versatility is showcased through applications in diverse astrophysical environments, such as the surroundings of astrophysical sources, galactic, and extragalactic landscapes. With a user-friendly implementation of custom photon fields, CRPropa 3.2 opens up possibilities for tailored simulations. This contribution offers an overview of the framework's new features and presents applications focusing on cosmic-ray and gamma-ray propagation, with a specific emphasis on aspects crucial for researching Intergalactic and Galactic Magnetic Fields.

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