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Geant4.jl: Particle Transportation in Julia

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The Julia programming language, renowned for its speed and ease of development, has emerged as a powerful tool for scientific computing and numerical simulations. In this paper, we introduce Geant4.jl, a Julia package that offers bindings for the Geant4 toolkit. Geant4, a widely utilised framework in high-energy physics, nuclear physics, medical physics, and space science, is characterised by its extensive library comprising thousands of C++ classes and intricate design. Our primary objective in developing Geant4.jl is to provide a user-friendly interface tailored specifically for simulation application developers. This interface not only enhances usability but also ensures optimal computational performance, leveraging features such as multithreading. We underscore the substantial advantages offered by this streamlined toolkit, particularly when compared to the intricacies of the C++ interface, which occasional users often contend with when developing customised simulations.

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