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Advances in Amplitude Analysis with Julia

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In the intricate realm of hadron physics, characterized by complex dynamics and a myriad of phenomena, there's a pressing need for tools that are both intuitive and robust. Enter the Julia language, celebrated for its adaptability and computational prowess. It has been adeptly utilized to craft libraries that delve deep into the nuances of particle decays, particularly those involving spin. The ThreeBodyDecay.jl package, tailored for three-body decays, showcases the elegance of Dalitz plots rendered in Julia. An intriguing aspect to note is the emergence of peaks and nodes in the decay probability distribution when particles with spin decay, a phenomenon that can be swiftly discerned with ThreeBodyDecay.jl.

The recent synergy with SymPy in SymbolicThreeBodyDecays.jl, facilitated by Julia's adept multiple dispatch mechanism, has revolutionized the capabilities of the module. Beyond the visual delight of inspecting decay models with seamlessly printed LaTeX expressions, there lies a significant advantage: the symbolic representation of the model. This approach not only foster model preservation but also paves the way for cross-language collaboration. It establishes a bridge between Julia and other programming languages and tools, such as Python's JAX, and anticipates integration with RooFit. This collaborative dimension accentuates Julia's potential to propel particle physics research, fostering cross-platform synergy.

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