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Feynman Integral: Synergies Between Particle Physics and Gravitational Waves

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The calculation of scattering amplitudes in particle physics heavily relies on Feynman integrals. One of the key properties of these integrals is that they obey linear relations, enabling the simplification of scattering amplitude calculations. Specifically, they are used for decomposing the amplitudes into a basis of functions called master integrals and evaluating them using differential equations. By exploring the vector space structure of Feynman integrals and utilizing intersection theory, a more comprehensive understanding of their characteristics can be obtained. Additionally, these integrals have practical applications in the field of gravitational wave physics, where precise observables can be obtained by leveraging the techniques developed in particle physics. In this talk, we will discuss the structure of Feynman integrals and highlight their crucial role in advancing both particle physics and gravitational wave physics.

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