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Projection Operator and Feynman Propagator for a Free Massive Particle of Arbitrary Spin

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Abstract: Based on the solution to the Bargmann-Wigner equations, a direct derivation of the projection operator and Feynman propagator for a free massive particle of arbitrary spin is worked out. The projection operator constructed by Behrends and Fronsdal is re-deduced and confirmed, and simplified in the case of half-integral spin, the general commutation rules and Feynman propagator with additional non-covariant terms for a free massive particle with any spin are derived, and explicit expressions for the propagators for spins 3/2, 2, 5/2, 3, 7/2, and 4 are provided.

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