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Relativistic Dynamics of Quasistable States: The Bakamjian-Thomas Construction SUJEEV WICKRAMASEKARA, Grinnell College — We study a synthesis of the S-matrix description of resonances with the Bakamjian-Thomas (BT) construction of incorporating interactions into a system of relativistic quantum particles. The BT-construction does not assume the existence of local fields mediating interactions. Therefore, it constitutes a theoretical framework more general than that of quantum field theories and is also devoid of many of the mathematical and conceptual difficulties of the latter. Characterization of resonances by the poles of the S-matrix has many advantages, foremost among which is perhaps the gauge invariance of the definitions of mass and width, a problem with which the field theoretical definitions suffer. Our construction shows that there exists irreducible representations of the semigroup of fundamental causal transformations of the relativistic spacetime that provide a description of relativistic resonances. These representations are generated by the interaction-incorporating Poincaré Lie algebra obtained from a suitable BT-construction and are characterized by the S-matrix complex pole position and spin of the resonance.

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