



Mathematical Physics

A Relativistic Version of the Two-Level Atom in the Rest-Frame Instant Form of Dynamics

David Alba, Horace W. Crater, Luca Lusanna

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We define a relativistic version of the two-level atom, in which an extended atom is replaced by a point particle carrying suitable Grassmann variables for the description of the two-level structure and of the electric dipole. After studying the isolated system "atom plus the electro-magnetic field" in the electric-dipole representation as a parametrized Minkowski theory, we give its restriction to the inertial rest frame and the explicit form of the Poincaré generators. After quantization we get a two-level atom with a spin 1/2 electric dipole and the relativistic generalization of the Hamiltonians of the Rabi and Jaynes-Cummings models.

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