

What is an elementary particle in the first-quantized Standard Model?

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Abstract

The purpose of this paper is to elucidate the concept of an elementary particle in the first-quantized Standard Model. The emphasis is upon the mathematical structures involved, rather than numerical computations. After the general concepts and philosophical outlook are introduced in the opening section, Section 2 addresses the question of what a free elementary particle is, paying particular attention to the relationships between the configuration representation and momentum representation. Section 3 deals with gauge fields, Section 4 deals with interactions between particles and gauge fields, Section 5 deals with composite systems, and Section 6 deals with the representation of Baryons, Mesons, and Hadrons. Section 7 addresses the interpretational question of whether an elementary particle has only one intrinsic state, and Section 8 attempts to elucidate what an interacting elementary particle is in the Standard Model.

Keywords: Elementary Particles Space Time Gauge Fields Interactions Bundles Groups Intrinsic Extrinsic Symmetry Endurantist Perdurantist

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