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Multi-particle fields on a subset of simultaneity

We propose a model describing the scattering of hadrons as bound states of their constituent quarks. We analyze the role of simultaneity in measurements of the characteristics of different particles for the description of relativistic quantum systems. On the basis of this analysis we conclude that the relativistic scattering of bound states of particles should not be described by the fields defined on the Minkowski space, but on the subset of simultaneous events, which is singled out from the tensor product of two Minkowski spaces. Such fields are called multi-particle fields. Next we build the dynamic equations for the multi-particle fields on the subset of simultaneity, using the Lagrange method, similar to the case of "usual" single-particle fields. We then consider the gauge fields restoring the local internal symmetry on the subset of simultaneity. The dynamic equations for the multi-particle gauge fields describe such phenomena as confinement and asymptotic freedom of colored objects under certain boundary conditions, and the mechanism of spontaneous braking of symmetry – under anothers. With these dynamic equations we are able to describe within a single model the quark confinement in hadrons, and their interaction during hadron scattering through the exchange of the bound states of gluons – the glueballs.

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