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Quarks and Antiquarks interacting in Electrodynamical Interactions

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Quarks and antiquarks carry electric charges and can interact in quantum electrodynamcal (QED) interactions. There appear no laws that forbid quarks and antiquarks to interact in QED interactions alone. Permitted on the basis of Gell-Mann's Totalitarian Principle that what is not forbidden is allowed and motivated by observations of low-mass anomalous particles in [1,2,3], we study the consequences of quarks and antiquarks in QED interactions alone [4,5,6]. We find that as the electrodynamical interactions between quarks and antiquarks with opposite signs of electric charges are attractive and quarks cannot be isolated, there can be stable composite light-quark states of neutral QED mesons and the QED neutron in the mass region of many tens of MeV [4,5,6]. Recent observations of the anomalous soft photons [1], the X17 particle [2], and the E38 particle [3] in the low-mass region provide positive experimental supports for the existence of some of the QED composite states. These anomalous particles may be produced during the deconfinement-to-cofinement phase transition of the quark-gluon plasma phase transition and may be used a signature for the quark-gluon plasma. The search for these states in high-energy heavy-ion collisions and the relevance of the QED neutron as a dark matter candidate particle will be examined and discussed.

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Collaboration

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