Aspects of chiral symmetry*

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In this review the basic concepts of chiral symmetry in nuclear physics are reviewed. Effective chiral models such as the linear and nonlinear sigma model will be discussed as well as the essential ideas of chiral perturbation theory. Based on these models heuristic derivations of important current algebra relations, such as the Gell-Mann Oakes Renner relation, are provided. Emphasis is given to the applications for the physics of ultrarelativistic heavy ion collisions. In particular questions such as chiral restoration, temperature and density dependencies of the scalar quark condensate are discussed. We also give a critical review concerning changes of vector meson masses and their relation to chiral symmetry. The basic principles behind the formation of disoriented chiral condensates are also discussed. The purpose of this review is to serve as an introduction to the chiral symmetry aspects of the physics of ultrarelativistic heavy ion collisions.

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Properties of hadrons in the nuclear medium *

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This review is devoted to the discussion of hadron properties in the nuclear medium and its relation to the partial restoration of chiral symmetry. Special attention is given to disentangling in-medium effects due to conventional many-body interactions from those due to the change of the chiral condensate. In particular, we medium effects on the Goldstone bosons (pion, kaon and eta), the vector mesons (rho, omega, phi), and baryons (nucleon, delta, hyperons) are discussed. Also, for each proposed in-medium effect the experimental consequences are reviewed. These include subthreshold kaon production, kaon flow and pion spectra for the Goldstone bosons. Dilepton production is the central observable for the vector mesons and the relevance of the most recent measurements for possible in-medium modifications is thoroughly discussed.

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