High Energy Physics - Phenomenology

Structure of scalar mesons and the Higgs sector of strong interaction

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The scalar mesons $\sigma(600)$, $\kappa(800)$, $f_0(980)$ and $a_0(980)$ together with the pseudo Goldstone bosons π, K, and η may be considered as the Higgs sector of strong interaction. After a long time of uncertainty about the internal structure of the scalar mesons there now seems to be consistency which is in line with the major parts of experimental observations. Great progress has been made by introducing the unified model of Close and T\"ornqvist. This model states that mesons below 1 GeV may be understood as $q^2\bar{q}^2$ in S-wave with some $q\bar{q}$ in P-wave in the center, further out they rearrange as $(q\bar{q})^2$ and finally as meson-meson states. The P-wave component inherent in the structure of the neutral scalar mesons can be understood as a doorway state for the formation of the scalar meson via two-photon fusion, whereas in nucleon Compton scattering these P-wave components serve as intermediate states. The masses of the scalar mesons are predicted in terms of spontaneous and explicit symmetry breaking.

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