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Dense hadronic matter in compact stars

The existence of stars with masses up to $2 M_{\odot}$ and the hints of the existence of stars with radii smaller than about 11 km seem to require, at the same time, a stiff and a soft hadronic equation of state at large densities. We argue that these two apparently contradicting constraints could be actually an indication of the existence of two families of compact stars: hadronic stars, whose equation of state is soft, can be very compact, while quark stars, whose equation of state is stiff, can be very massive. In this respect, a crucial role is played, in the hadronic equation of state, by the delta isobars whose early appearance shifts to large densities the formation of hyperons.

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