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Charge-conjugation asymmetry and molecular content: the $T_{cc}(3875)$ and $D_s(2317)$ in nuclear matter

We analyze the modifications that a dense nuclear medium induces in the $D_s(2317)^\pm$ and $T_{cc}(3875)^\pm$. In the vacuum, we consider them as isoscalar DK (Dbar Kbar) and DD (Dbar Dbar) S-wave bound states, which are dynamically generated from effective interactions that lead to different Weinberg compositeness scenarios. Matter effects are incorporated through the two-meson loop functions, taking into account the self energies that the D, D, Dbar, Dbar, K and Kbar develop when embedded in a nuclear medium. Although $D_s(2317)$ and $T_{cc}(3875)$ particle-antiparticle lineshapes are the same in vacuum, we find extremely different density patterns in matter. This charge-conjugation asymmetry for the $D_s(2317)$ [$T_{cc}(3875)$] mainly stems from the very different kaon [Dbar and Dbar] and antikaon [D and D] interaction with the nucleons of the dense medium. We show that the in-medium lineshapes found for these resonances strongly depend on their DK and DD molecular contents, respectively, and discuss how this novel feature can be used to better determine/constrain the inner structure of these exotic states.

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