

An effective field theory approach to the interactions of the doubly charmed state T_{cc}^+ with a hadronic medium

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The recently observed doubly charmed state T_{cc}^+ belongs to the family of the multi-quark states called exotic hadrons. One of main goals of modern hadron physics is to determine the structure of these exotic hadrons. Nucleus-nucleus collisions at the LHC offer a possibility to achieve this goal. The yield of T_{cc}^+ 's produced at the end of the quark-gluon plasma phase of nuclear collisions is related to the internal structure of the state. However this yield may be affected by the interactions in the hadron gas phase. We investigate the absorption and production processes of this new state in a hadronic medium, considering the reactions $T_{cc}^+\pi, T_{cc}^+\rho \rightarrow D^{(*)}D^{(*)}$ and the corresponding inverse reactions. We use effective field Lagrangians to account for the couplings between light and heavy mesons. The absorption cross sections are found to be larger than the production ones. We compare our results with the only existing estimate of these quantities, presented in a work of J. Hong, S. Cho, T. Song and S. H. Lee, in which the authors employed the quasi-free approximation. We find cross sections which are one order of magnitude smaller. The subject deserves further investigation.

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