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$X(3872)$ production in high energy heavy ion collisions

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We determined the production cross sections of the $X(3872)$ state in the reactions $DD \rightarrow \pi X$, $D^* D \rightarrow \pi X$ and $D^* D^* \rightarrow \pi X$. We construct a formalism considering X as a molecular bound state of $D^0 D^* 0$ -c.c., $D^- D^* +$ -c.c and $D^- s D^* + s$ -c.c. To obtain the amplitudes related to these processes we have made use of effective field Lagrangians. We have evaluated the cross section for the reaction $D^* D \rightarrow \pi X$, and find that the diagrams involving the $X D^* D^*$ vertex give a large contribution. We also estimate the $X D^* D^*$ coupling, which turns out to be 1.95 ± 0.22 . We then use it to obtain the cross section for the reaction $D^* D^* \rightarrow \pi X$ and find that, in this case too, the $X D^* D^*$ vertex is relevant. We also discuss the role of the charged components of X in the determination of the production cross sections.

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