Studies of the X(3872) ARMAN MARGARYAN, ROXANNE SPRINGER, Duke, Physics — The $X(3872)$ is an unusual charmonium-like state that lies very close to the D^0 $\bar{D}^{0*}$ threshold. Heavy hadron chiral perturbation theory (HHχPT) and the effective field theory developed for the $X(3872)$ (XEFT) are applied to processes involving the $X(3872)$ and a photon. The existence of the decay mode $X(3872) \to J/\psi\gamma$ demands a $C = +1$ assignment for the $X(3872)$. The invariant mass distribution in the decay $X(3872) \to J/\psi\pi^+\pi^-$ is consistent only with the $J^{PC} = 1^{++}$ quantum number assignment for the $X(3872)$ particle. This suggests that the $X(3872)$ wavefunction may be dominated by long distance physics, hence coupling strongly with a $(D^0\bar{D}^{0*} + \bar{D}^0 D^{0*})$ molecular bound state. Here we present some differential cross sections involving the $X(3872)$. They depend on the angle between the final photon momentum and initial or final particle polarization vectors. These angular distributions may distinguish between long distance and short distance components of the $X(3872)$, so that future measurements may provide information about the structure of the $X(3872)$.

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