

Abstract

We consider Klein-Gordon equations with an external potential and cubic nonlinearity in three spatial dimensions. It is assumed that the linear operator has internal modes, and hence the unperturbed linear equation has time-periodic solutions known as bound states. In 1999, Soffer and Weinstein treated the case when the linear operator has one large eigenvalue and proved the decay of the solution. In 2022, we solved the general one eigenvalue case. In our recent work, we solved this problem in full generality: the operator can have multiple and possibly degenerate eigenvalues. Indeed, we determined the sharp decay rate of the overall solution, as well as distinct decay rates for different components of the solution. This is a joint work with Prof. Zhen Lei and Dr. Jie Liu.