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Eigenvector Continuation for Resonance States[1] NUWAN YAPA, SEBASTIAN KOENIG, North Carolina State University — Many nuclear states found in nature are not bound, but are resonances – meta-stable states that decay after a certain time period. Solving the quantum few-body problem to identify and study such resonance states is known to be a complex and computationally expensive task. However, a novel method known as Eigenvector Continuation (EC) has recently emerged as an intriguing tool to obtain approximate solutions for computationally expensive eigenvalue problems with great speed and accuracy. As a variational method at heart, EC provides a prescription to "learn" a tailored effective basis in which the desired solution is expanded. In this talk, we explore two different approaches for applying EC to resonances. First, we will demonstrate that EC works well with finite-volume calculations, where resonances are manifest as avoided crossings in the discrete spectrum of energy levels as the size of the volume is varied. Then we proceed and show that the same can be accomplished in momentum space, where we identify resonances as poles of the S-matrix analytically continued onto the second Riemann sheet in the complex energy plane. In both cases we emphasize how EC makes it possible to predict resonances using as input solely information from bound-state solutions.

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