Contribution ID: **694**   Type: **Oral (Student, Not in Competition) / Orale (Étudiant(e), pas dans la compétition)**

Asymmetric Wavefunctions from Tiny Perturbations

Monday 15 June 2015 15:45 (15 minutes)

We present an undergraduate-accessible analysis of a single quantum particle within a simple double well potential through matrix mechanics techniques. First exploring the behavior in a symmetric double well (and its peculiar wavefunctions), we then examine the effect that varying well asymmetry has on the probability density. We do this by embedding the potential within a larger infinite square well, expanding in this simple basis, and solving for the matrix elements. The resulting wavefunctions are drastically different than those of the unperturbed system. A relatively tiny drop in one of the well depths results in a nearly complete collapse (localization) of the wavefunction into one of the wells. This system can be accurately mapped to a much simpler two-state "toy model"; this makes it clear that this localization is also a property of a generic double well system.

Authors: DAUPHINEE, Tyler; MARSIGLIO, frank

Presenter: DAUPHINEE, Tyler

Session Classification: M2-8 Teaching Physics to a Wider Audience (DPE) / Enseigner la physique à un auditoire plus vaste (DEP)

Track Classification: Physics Education / Enseignement de la physique (DPE-DEP)