

Abstract Submitted  
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**Interference between two resonant transitions with distinct initial and final states connected by radiative decay**<sup>1</sup> ERIC A. HESSELS, MARKO HORBATSCH, ALAIN MARSMAN, York University — The resonant line shape from driving a transition between two states,  $|a\rangle$  and  $|b\rangle$ , can be distorted due to a quantum-mechanical interference effect involving a resonance between two different states,  $|c\rangle$  and  $|d\rangle$ , if  $|c\rangle$  has a decay path to  $|a\rangle$  and  $|d\rangle$  has a decay path to  $|b\rangle$ . This interference can cause a shift of the measured resonance, despite the fact that the two resonances do not have a common initial or final state. As an example, we demonstrate that such a shift affects measurements of the atomic hydrogen  $2S_{1/2}$ -to- $2P_{1/2}$  Lamb-shift transition due to  $3S$ -to- $3P$  transitions if the  $3S_{1/2}$  state has some initial population. Link: <https://doi.org/10.1103/PhysRevA.96.062111>

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