

## Abstract

We present progress towards the first direct measurements of the isotope shift, Stark shift and Stark induced amplitudes in the  $6P_{1/2} \rightarrow 6P_{3/2}$  transition in thallium. The weak nature of this “forbidden” M1 and E2 transition requires a new RF detection technique called “two-tone” spectroscopy, which we describe here. Using a vapor cell, we demonstrate that our detection apparatus has adequate sensitivity for measurements in the atomic beam. Precision measurements of atomic structure, such as these, provide strict tests of wavefunction calculations and electroweak physics, important steps in the ongoing efforts to refine the Standard Model and understanding of atomic properties.