

# Magneto Optical Traps to Perform Recoil Ion Momentum Spectroscopy

When observing excited population dynamics, recoil-ion momentum spectroscopy (RIMS) is a valuable technique that can directly measure excited-state fractions. However, its resolution is limited by thermal motion that confounds measurements of momentum change. To overcome this, the target can be placed in a magneto-optical trap (MOT), allowing for extremely accurate measurements (MOTRIMS). The specifics and mechanics of both parts of this procedure will be discussed.

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**John Lyons '17**

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**Friday, February 17, 2017 - 3:10 pm**  
**Senior Exercise Talks in Physics**

**Franklin Miller, Jr. Lecture**  
**Hall Hayes 109**

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Get ready for Jack Zellweger to explain the basic physics of black holes and coalescing binary black hole gravitational-wave emission. In particular, he will elucidate the only equation in the discovery paper of the first gravitational-wave signal ever directly observed — GW150914. This equation relates the frequency evolution of gravitational waves from

## What Gravitational Wave Signals Can Tell Us About Binary Black Holes

compact binaries to a mass-like quantity, called the binary's chirp mass. He will then demonstrate how this relationship and a simple eyeball analysis of the signal can provide a chirp mass estimate to within about 30% of the value quoted in the discovery paper, demonstrating how basic source parameters can be extracted from gravitational-wave signals.

**Jack Zellweger '17**