

SANDIA TALKS

Welcome



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

Special Thanks

PLANNING TEAM

Donnamarie Hayas (111)
Adriana Hernandez (111)
Abby Lutz (111)
Linda Jaramillo-Alfaro (10695)

CREATIVE SERVICES

Vince Gasparich (3653)
Stacey Reynolds (3653)
Stephanie Blackwell (3653)
Nick Kerekes (3653)

PRESENTERS

Chris Lino (634)
Greg Frye-Mason (1100)
Paul Clem (1353)
James Nistler (2496)
Josh Lamb (2546)
Pete DelMarcelle (33311)
Daniel Lobser (5225)
Shanalyn Kemme (5228)
Doug Ghormley (5600)
Cliff Ho (8820)
Allie Fetterolf (9428)

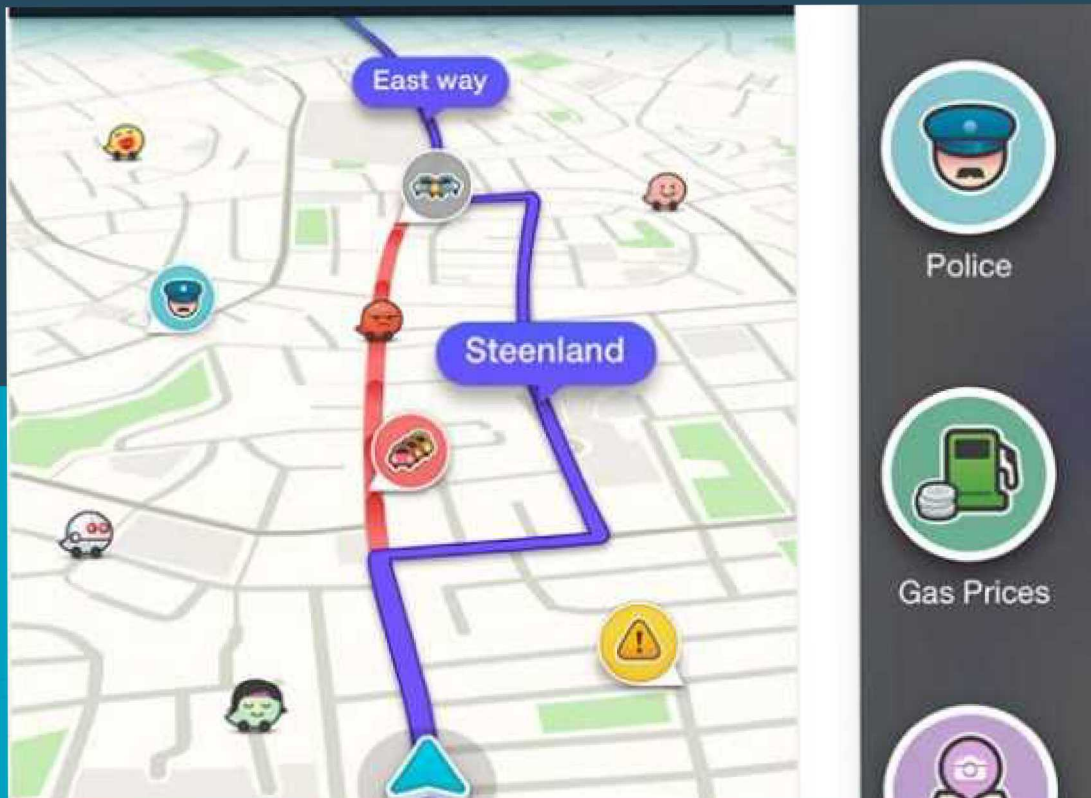


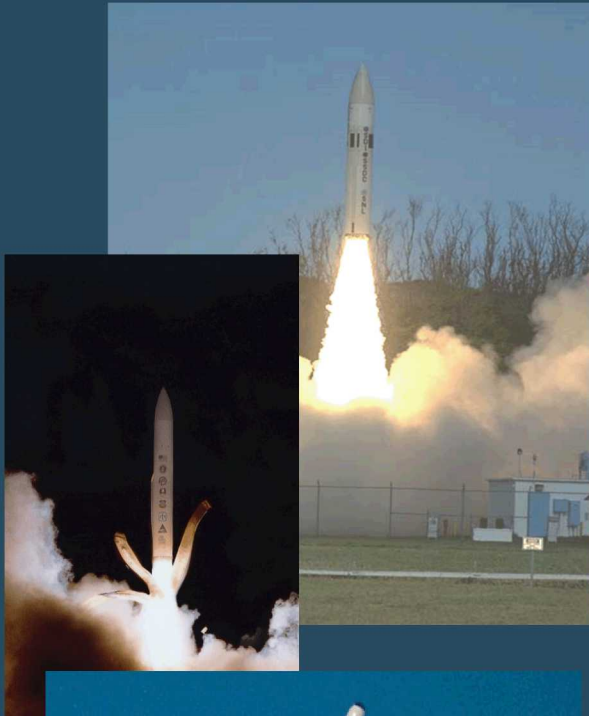
SANDIATALKS

Shanalyn Kemme

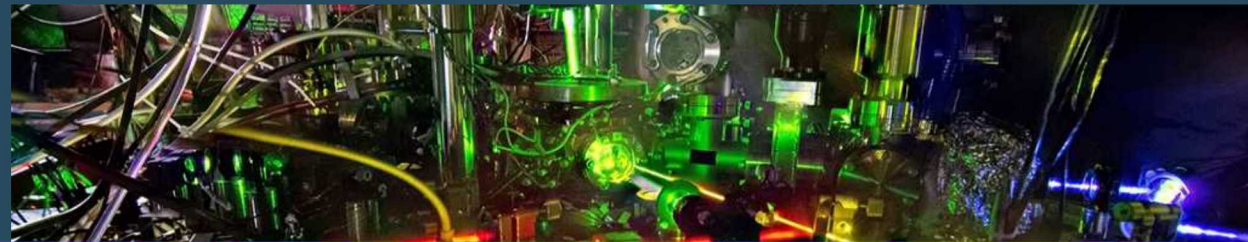
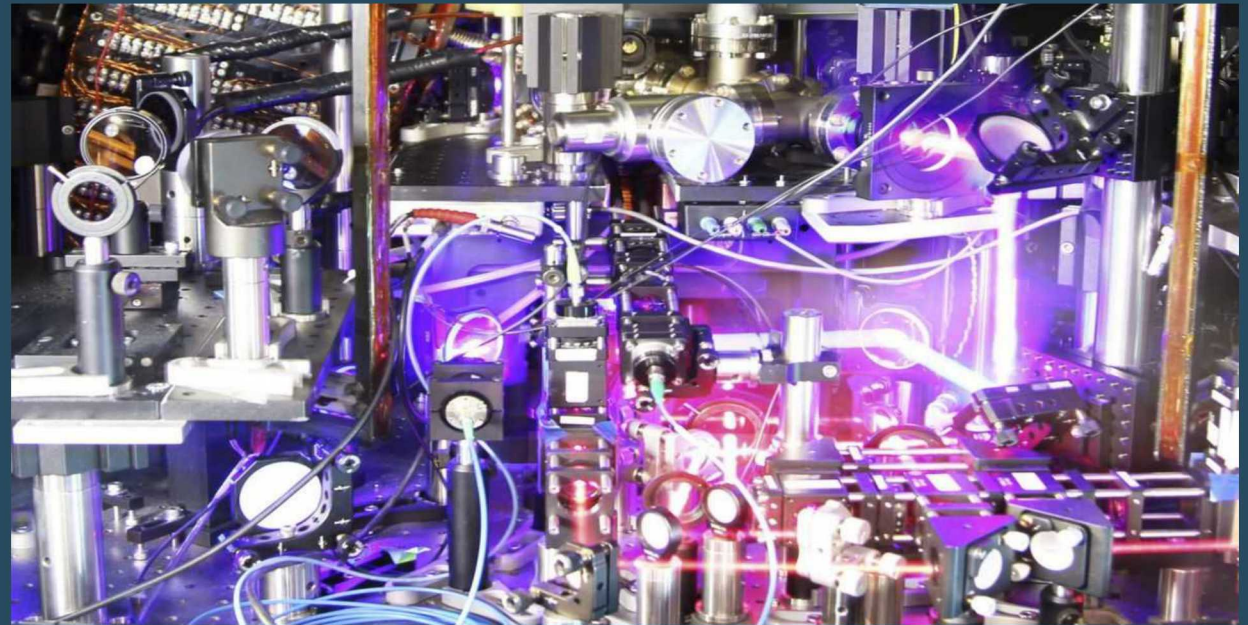
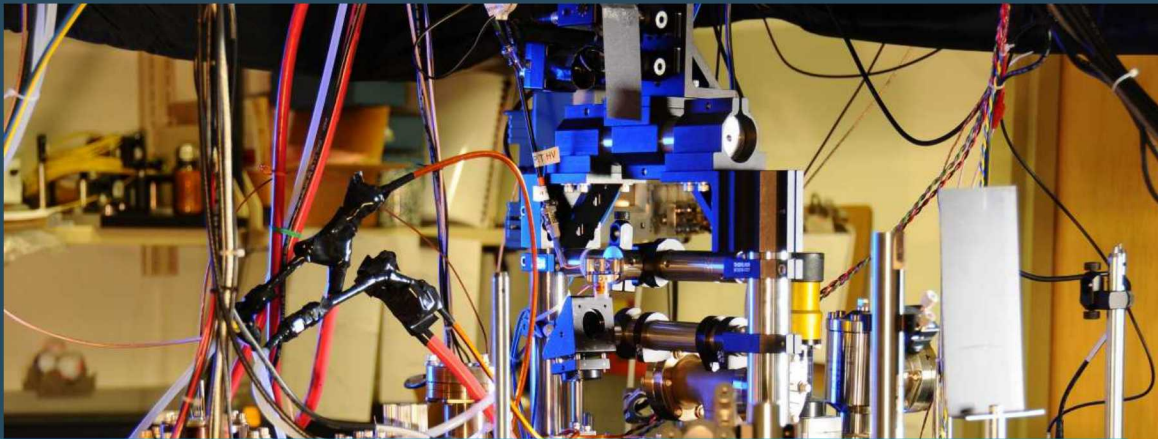
3 Cool Things About Quantum-Based Sensors

When do we need
accuracy and
precision?

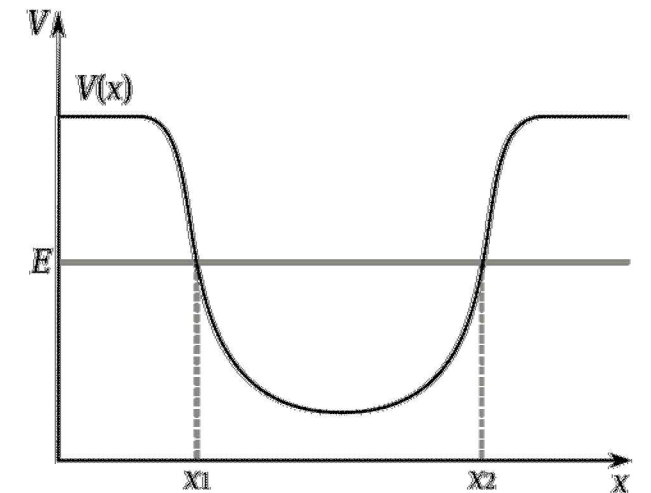
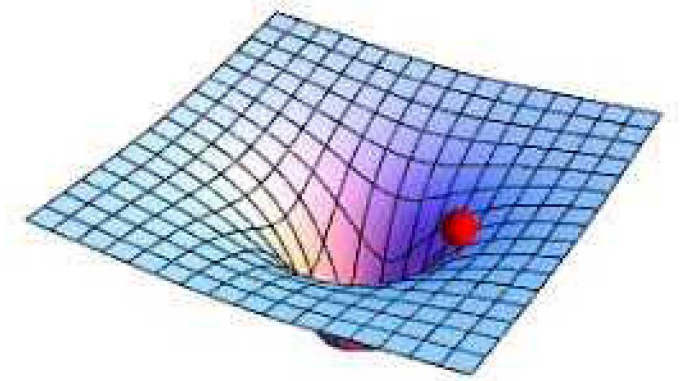
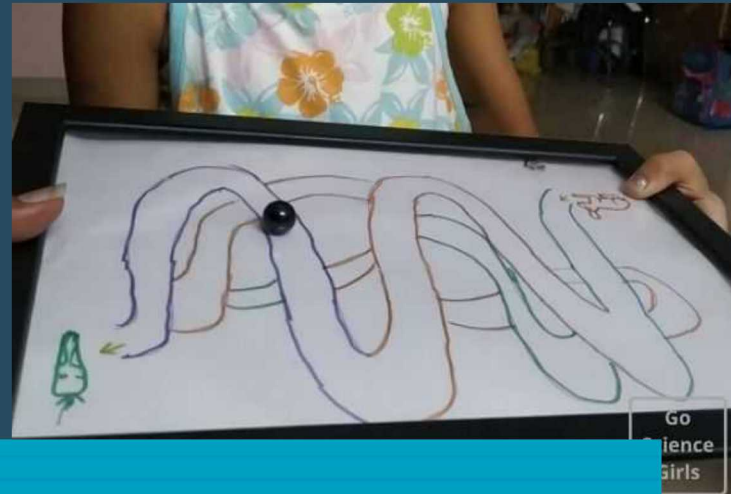




These
systems
need accuracy
and precision

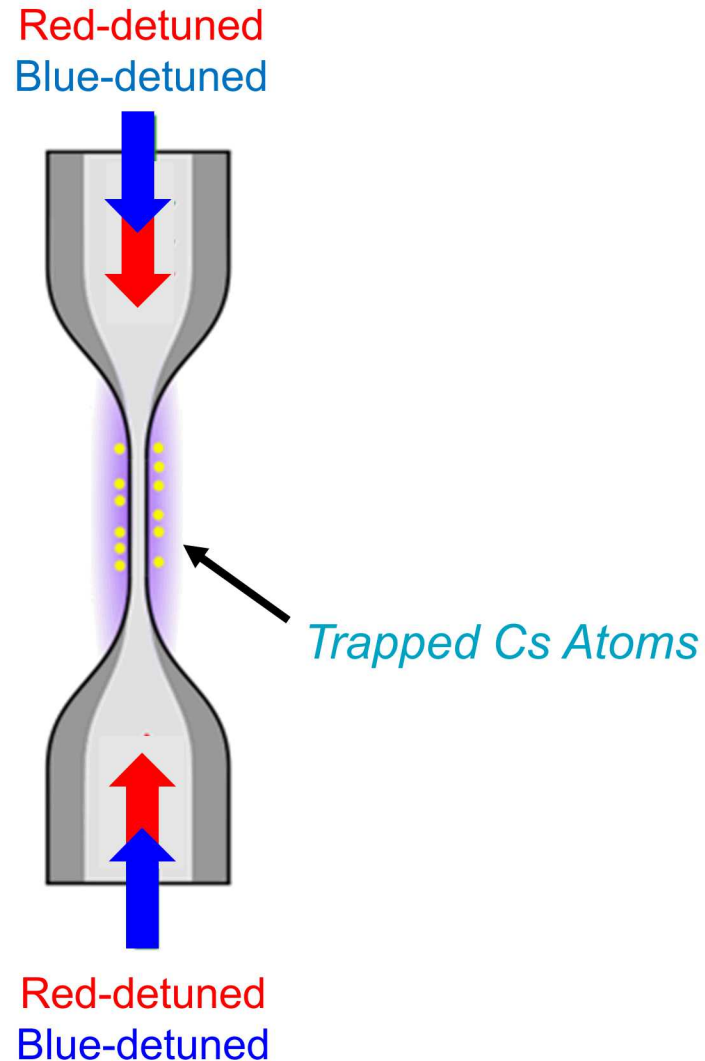


Atomic Clocks at NIST

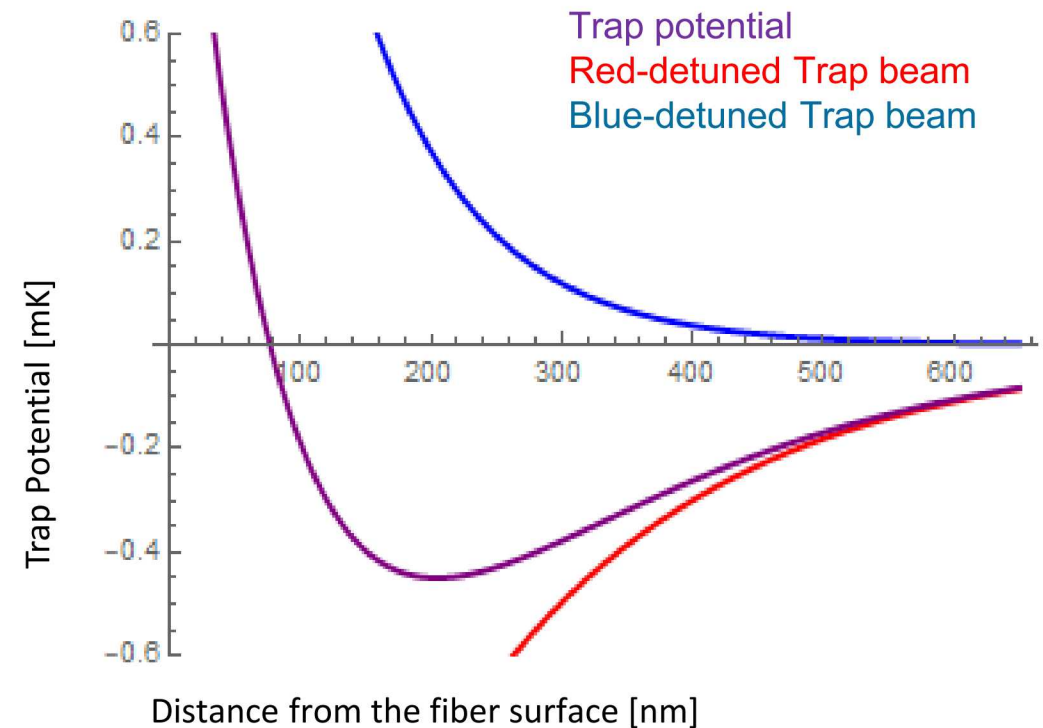


A Potential Well
– A Trap

#1 Trapping Neutral Atoms with Light – Atom Trap Outside Optical Fiber

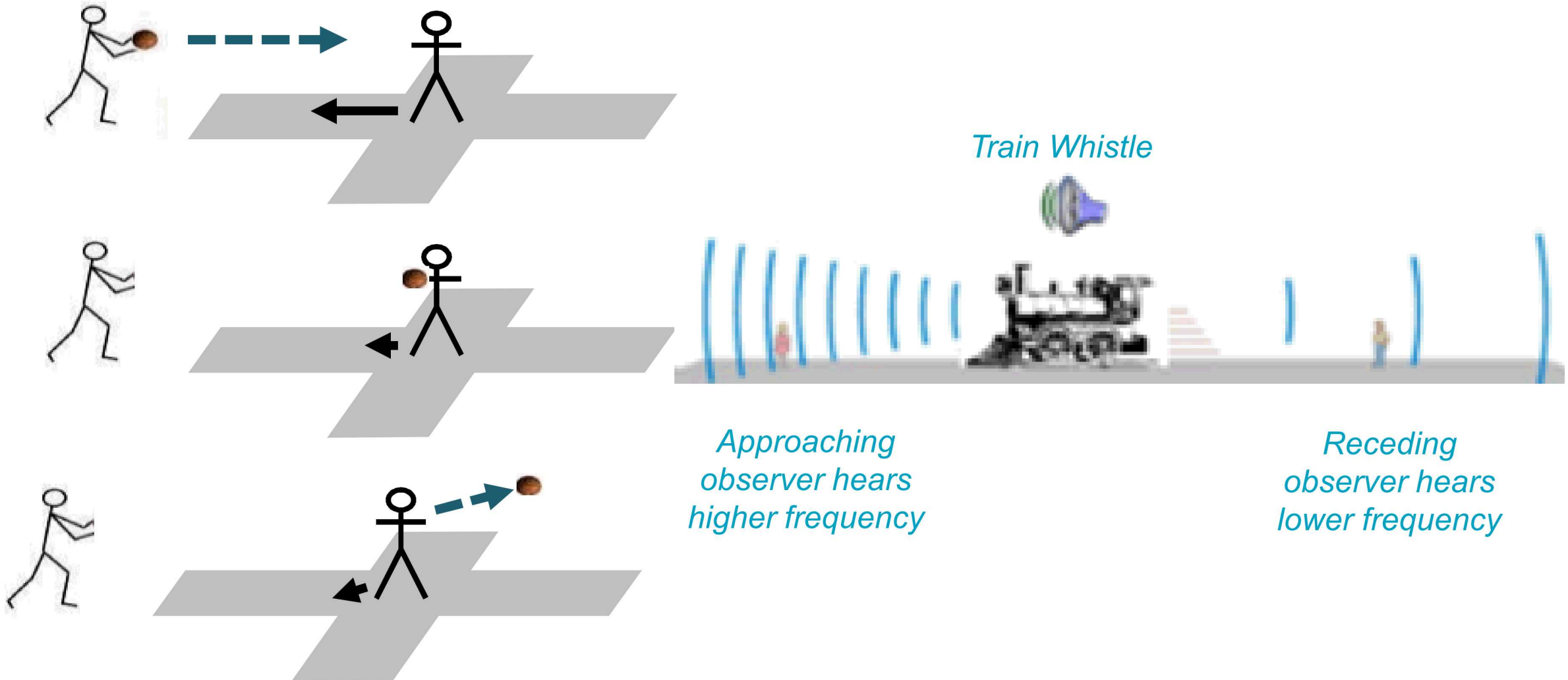


Red-detuned + Blue-detuned = Purple trap potential



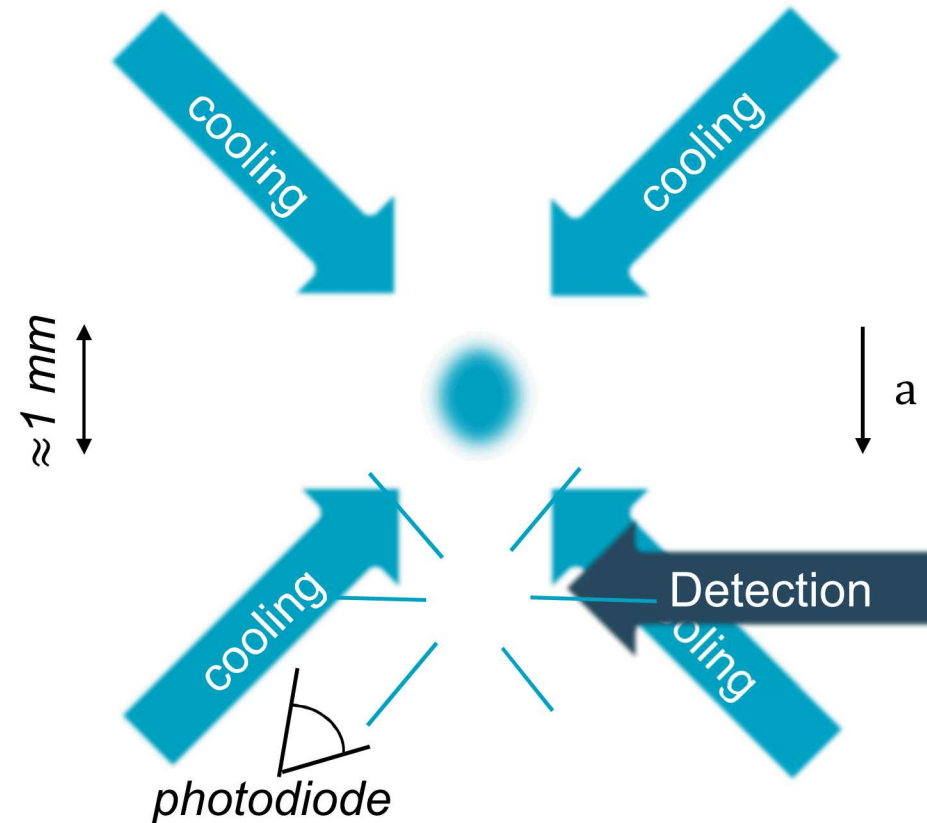
Demonstrated two-color evanescent-field atom trapping using nanofibers (SNL Aug 2019)

Slowing (#2 Cooling) a Neutral Atom with Photons



Cool, Trap, Release, Repeat – SIGMA

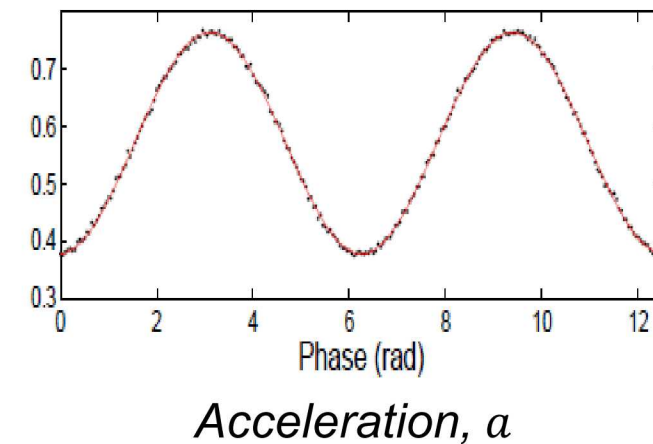
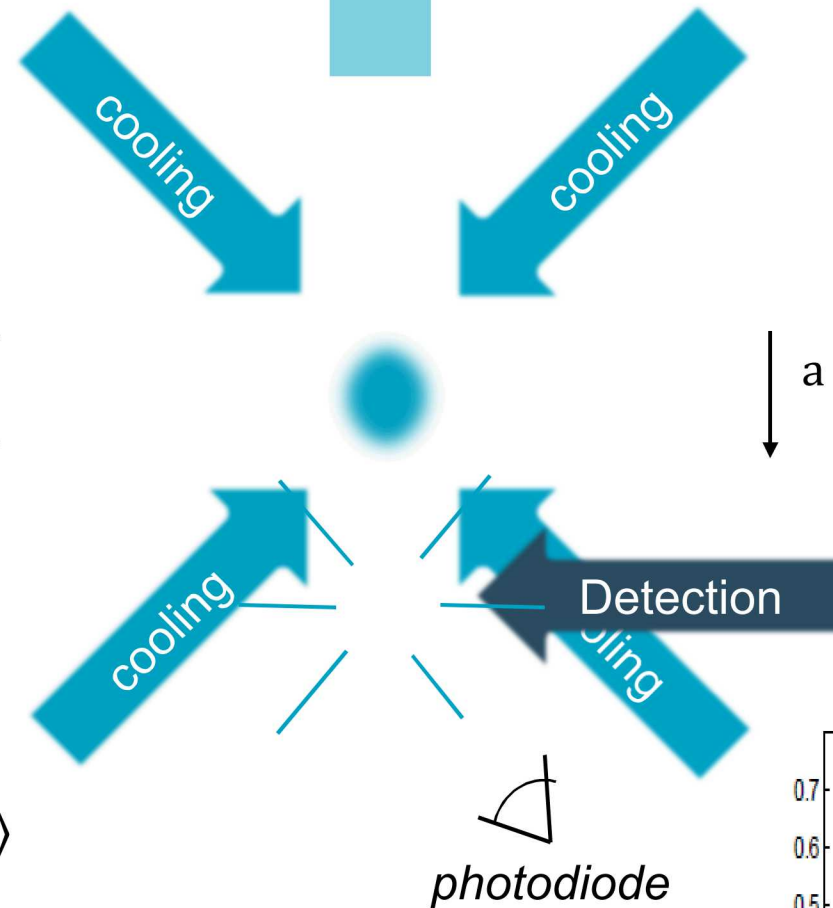
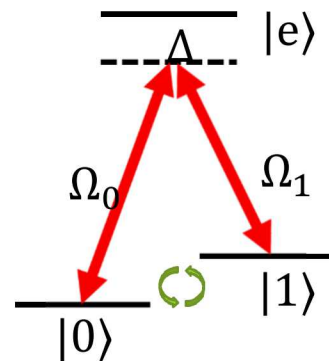
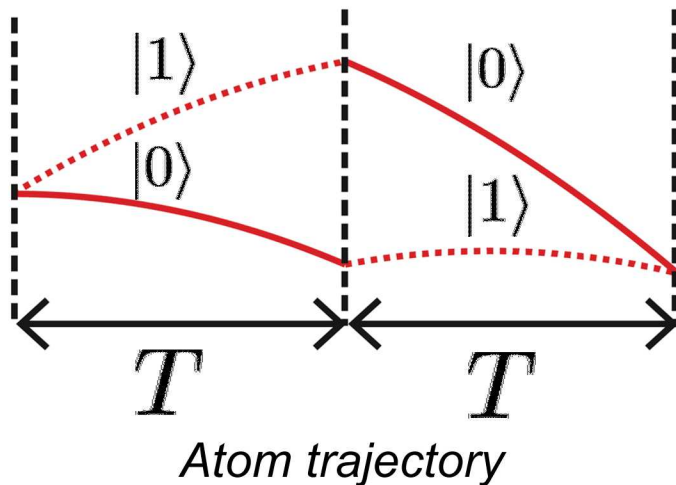
- Laser cool million atoms
 - Temp $\approx 15 \mu\text{K}$
- Release atoms
- Detect
- Recapture



SIGMA's Interferometer with a Million Atoms in the Ball

- Laser cool million atoms
- Release atoms
- Interferometer pulse sequence
- Detect
- Recapture

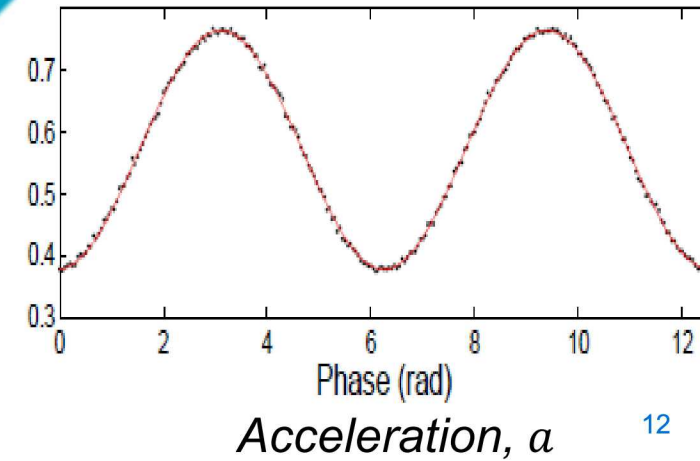
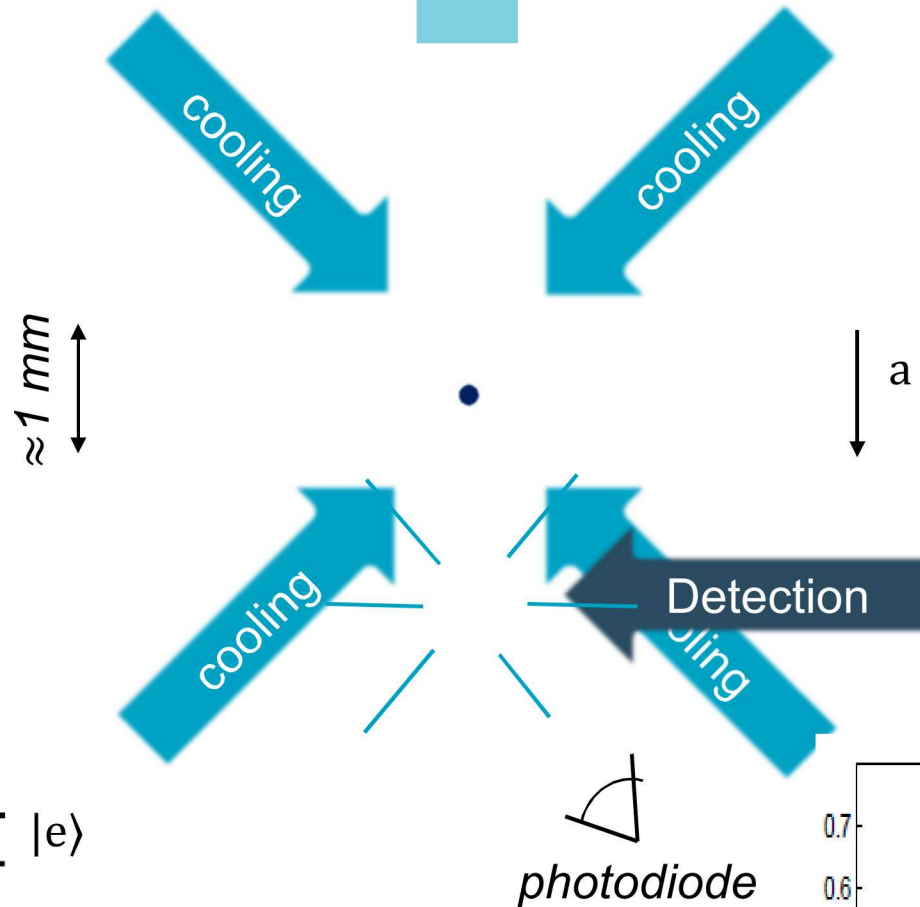
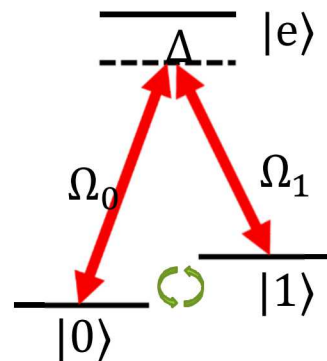
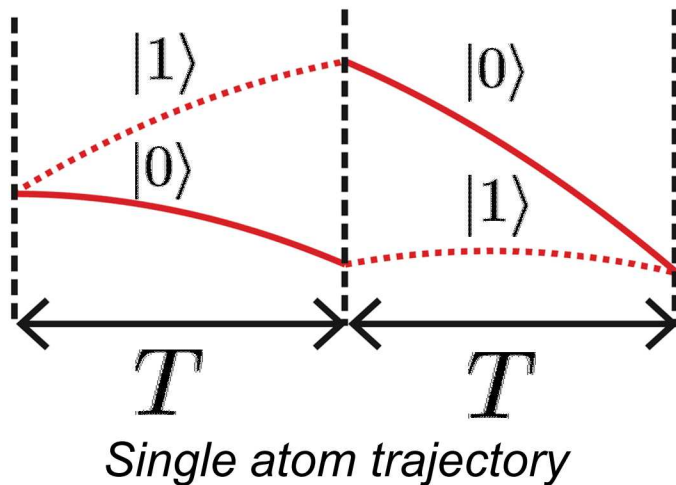
Why is it an interferometer?



SIGMA's Interferometer with 1 Atom – #3 Superposition

- Laser cool 1 atom
- Release atoms
- Interferometer pulse sequence
- Detect
- Recapture

Why is it an interferometer?



SANDIA TALKS

Thank You

SANDIA TALKS

talks.sandia.gov