Delivering practical atomic sensors and components

- Founded in 2004 to spin-off work from Stanford University
- Core capability is design, fabrication, and testing of atom-based inertial sensors and frequency standards
- 60k ft² R&D space located in Sunnyvale, CA.
  - 1000 ft² secure lab planned for Summer ‘15.

- Staff of 55 (50/50 mix of physicists and engineers)
  - One of the world’s largest atomic physics teams under one roof; 24 Ph.D.s trained under 7 Nobel laureates
  - Technical capabilities: Atomic physics, laser physics, vacuum engineering, packaging, optical and optomechanical engineering, precision manufacturing, electrical engineering, embedded systems, software engineering

- Potential contributions: Lasers and optical systems, integrated vacuum systems
  - R&D partner or commercial sales
**Integrated atom-optical sensors**

**AOSense commercial compact gravimeter**
- First commercial atom-optical sensor
- Shipped November 2010

**Integrated optical clock hardware**
- Integrated atomic beam (oven, slower, etc)
- Cooling and clock lasers, reference cavity, spectroscopy, beam routing
- Electronics interface
High-performance atomic beam hardware

500° C Atomic beam oven
- Laboratory-grade flux
- 200× smaller outgassing
- 4 W power consumption
- No cooling water

Permanent magnet slower
- Magnetic and thermal shielding
- Zero power consumption
- No cooling water

High-flux cold atomic beam
- In-vacuum optics, oven, and slower
- 10× larger cold beam flux than academic labs
- Pressure: 5×10⁻⁹ torr at oven (@ 530° C)
- Entire assembly same size as laboratory Zeeman slower

AOSense hardware in action at JILA

Thompson lab with AOSense atomic beam and 689 nm laser
IF-ECDL
- Filter-stabilized laser with robust cat’s eye design
  - High stability compared to traditional grating systems
- Narrow linewidth (~50 kHz) << DFB/DBR
- Architecture allows easy wavelength changes to any diode-friendly wavelength. No cavity re-design, new coatings only.
  - Demonstrated wavelengths (nm): 423, 461, 657, 689, 698, 767, 780, 852

Controller
- Current, TEC, and PZT control for IF-ECDL
- Ultra low noise, fast modulation ports
- Single +5V DC input, low power consumption
- Digital interface with GUI
- Compact, cost-effective solution for laser control

**ILC** | **Spec**
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Laser Current | 10-200 mA
Current Noise | <100 pA / Sqrt(Hz)
Current Modulation | DC-10 MHz
Current RF Modulation | Up to 100 MHz (AC)
PZT | 0-125 V
PZT Noise | < 500 nV / Sqrt (Hz)
PZT Modulation | DC-10 kHz
Input | +5 V DC
Power Consumption | 5 W Typ
Jamil Abo-Shaeer, Ph.D.
Director, Strategic Planning

jaboshaeer@aosense.com
(408) 636-2651

AOSense, Inc.
929 E. Arques Ave
Sunnyvale, CA 94085
Main: (408) 735-9500
www.AOSense.com

AOSense is hiring!
(Check the website for open positions / contact me)