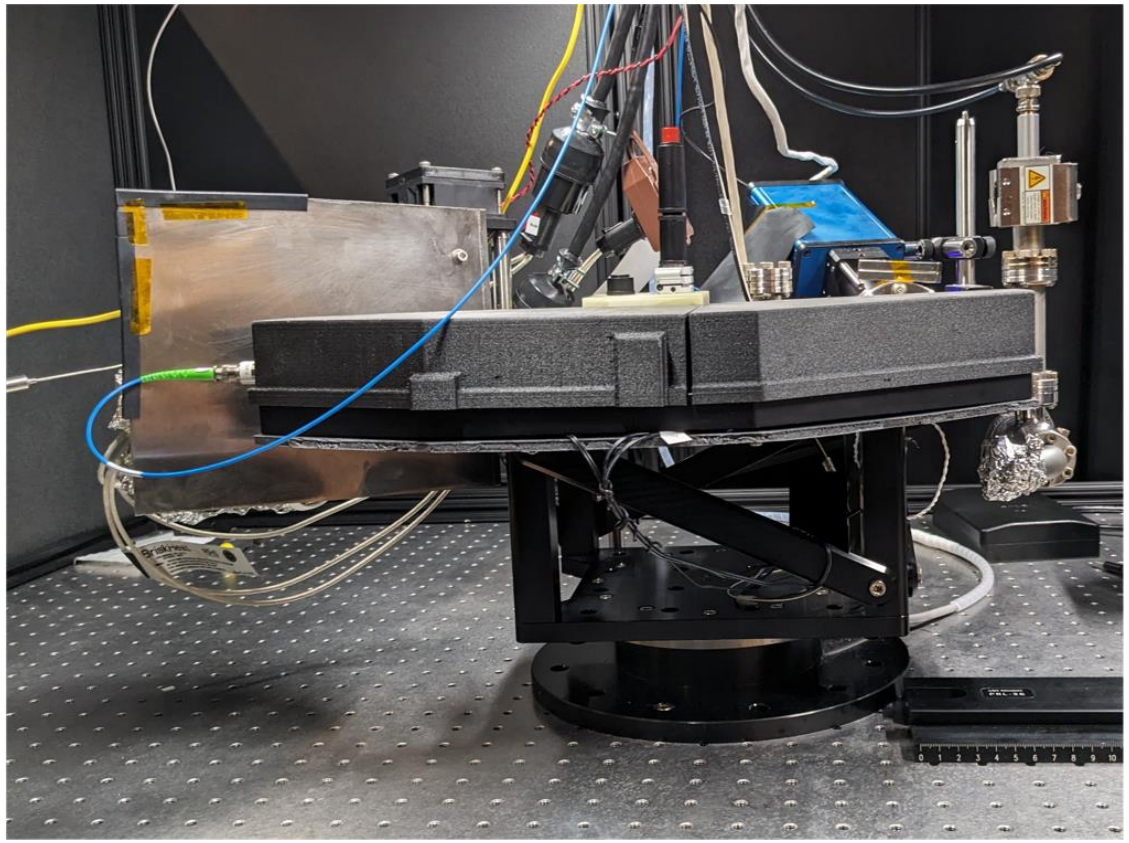
Independent Laser System for Strontium Atom-Interferometer Gyroscope



Matterwave interferometer in Lin Hall

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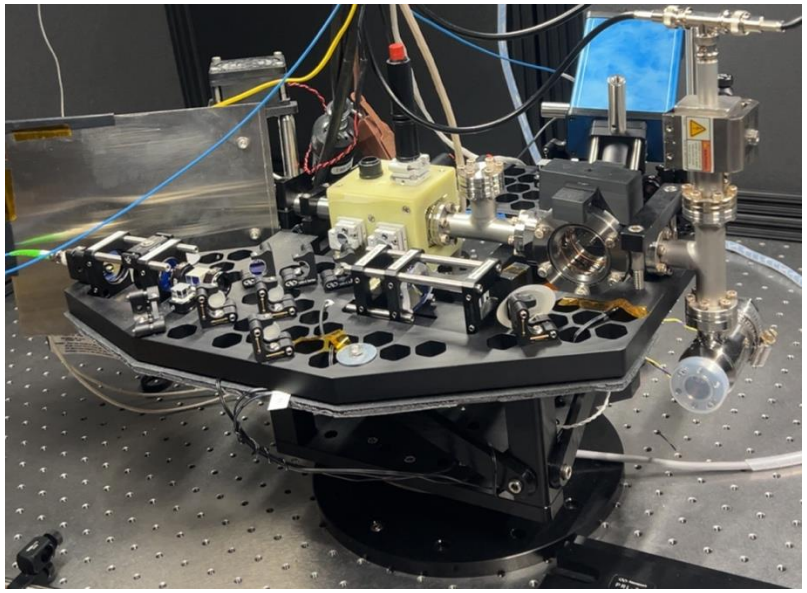
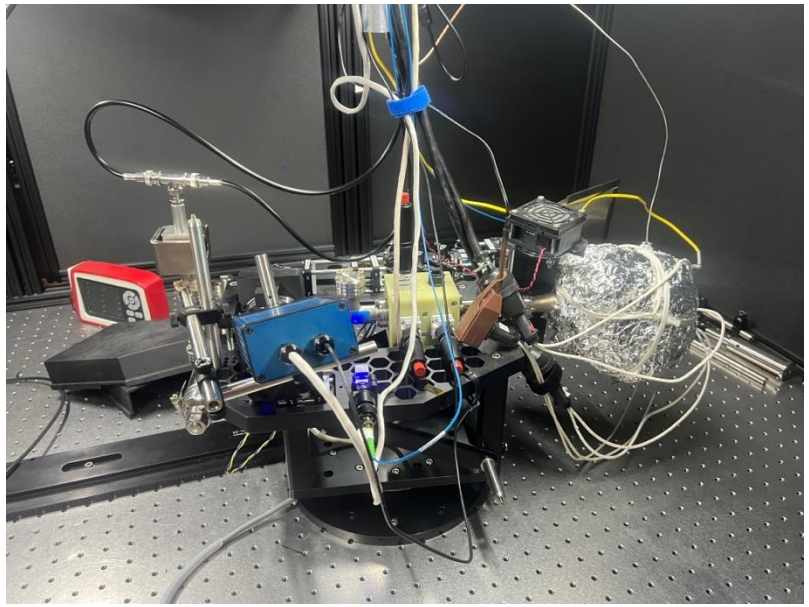
Advisor: Grant Biedermann

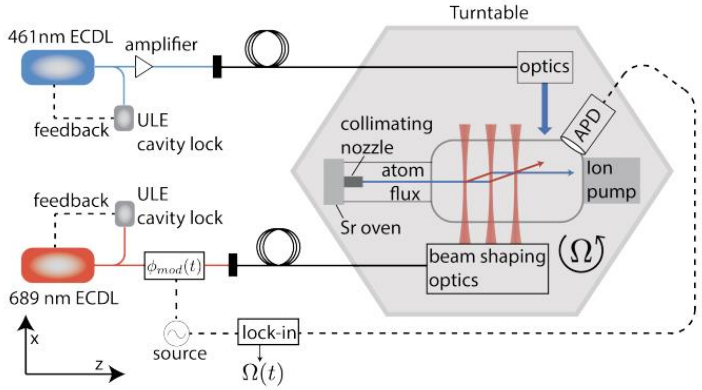
Graduate Student: Jason Gordon

Strontium AIG Apparatus



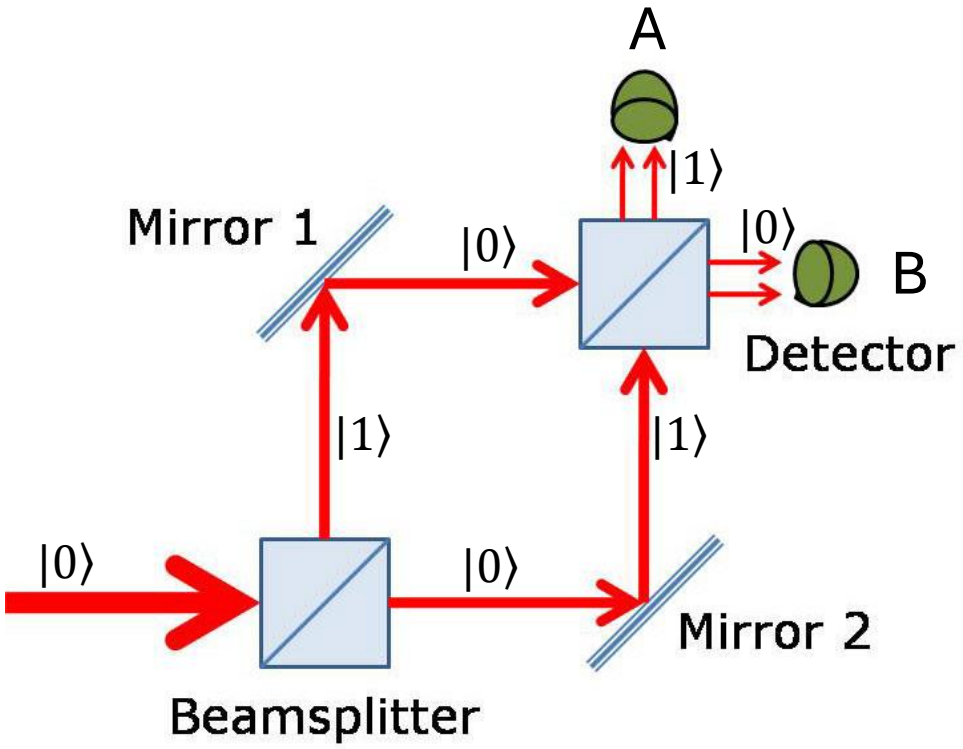


Apparatus

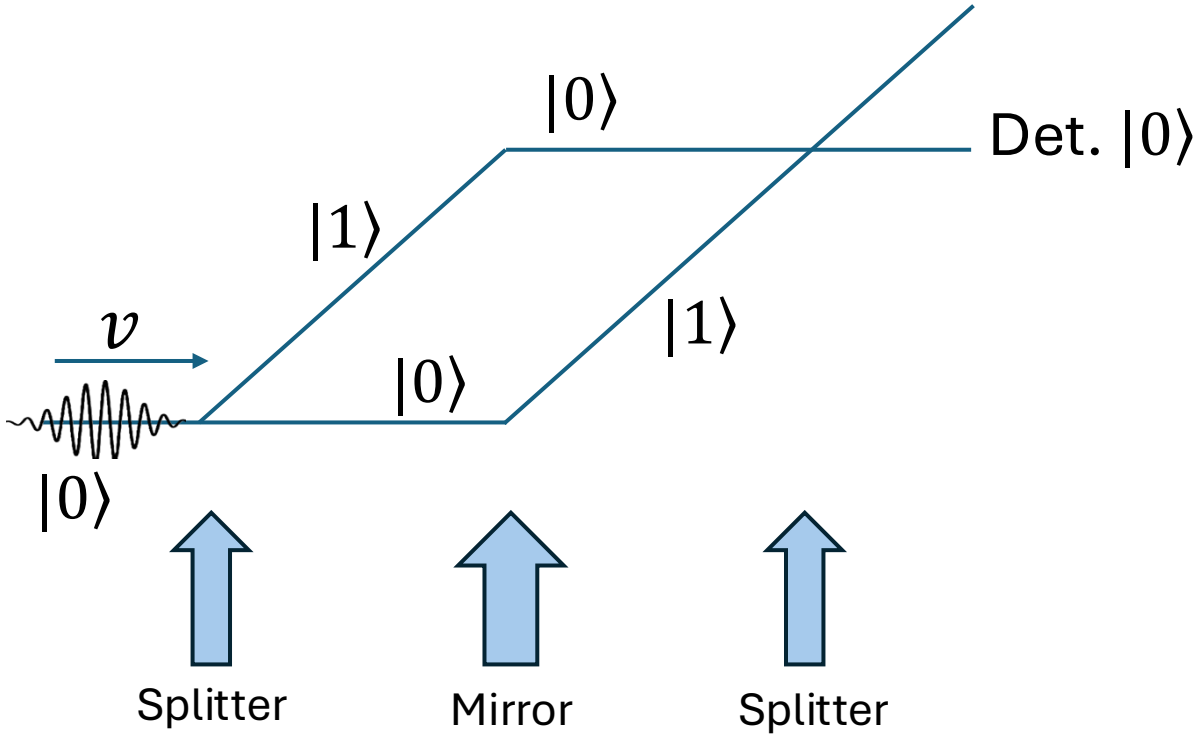


Experiment Overview

How does it work?

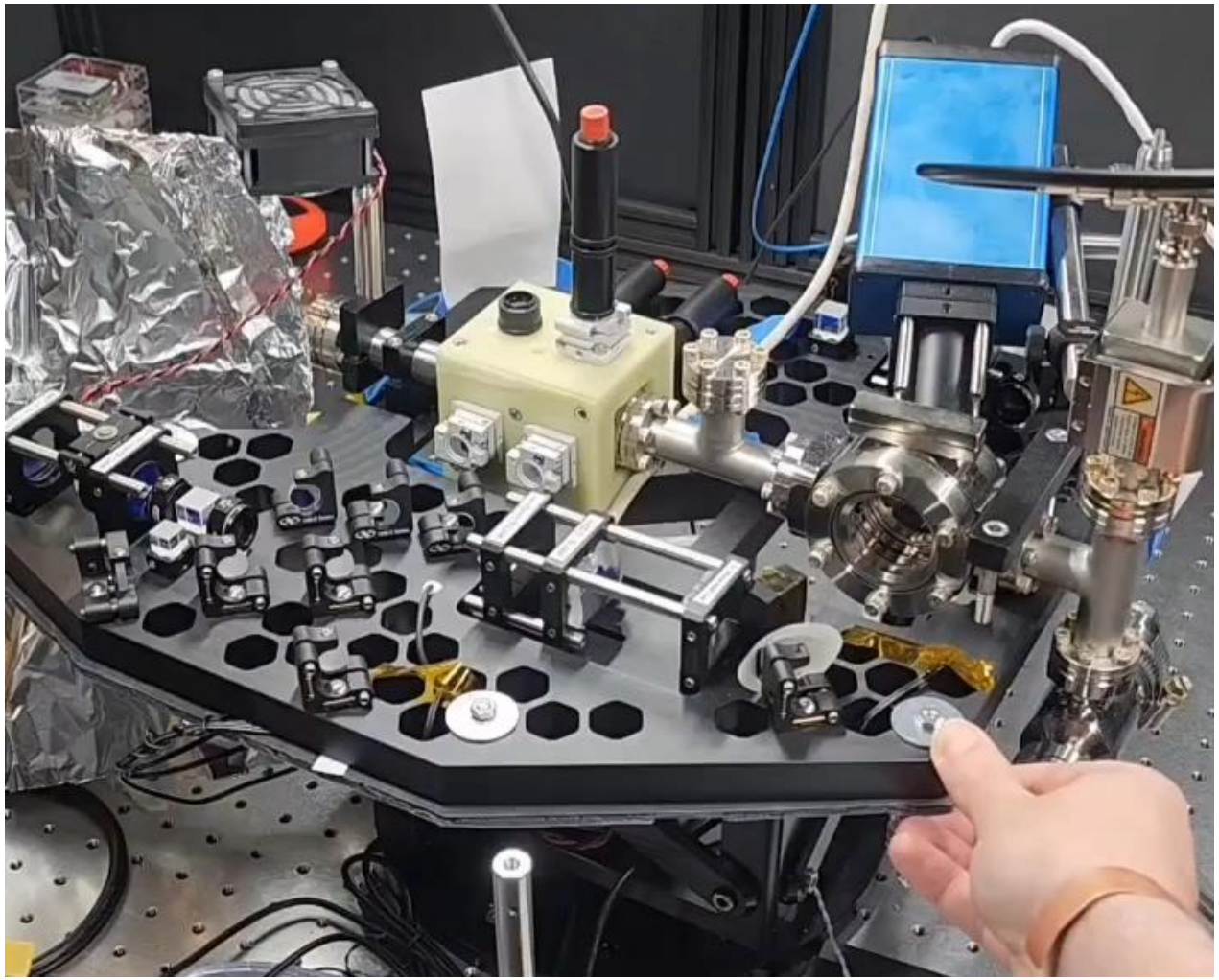


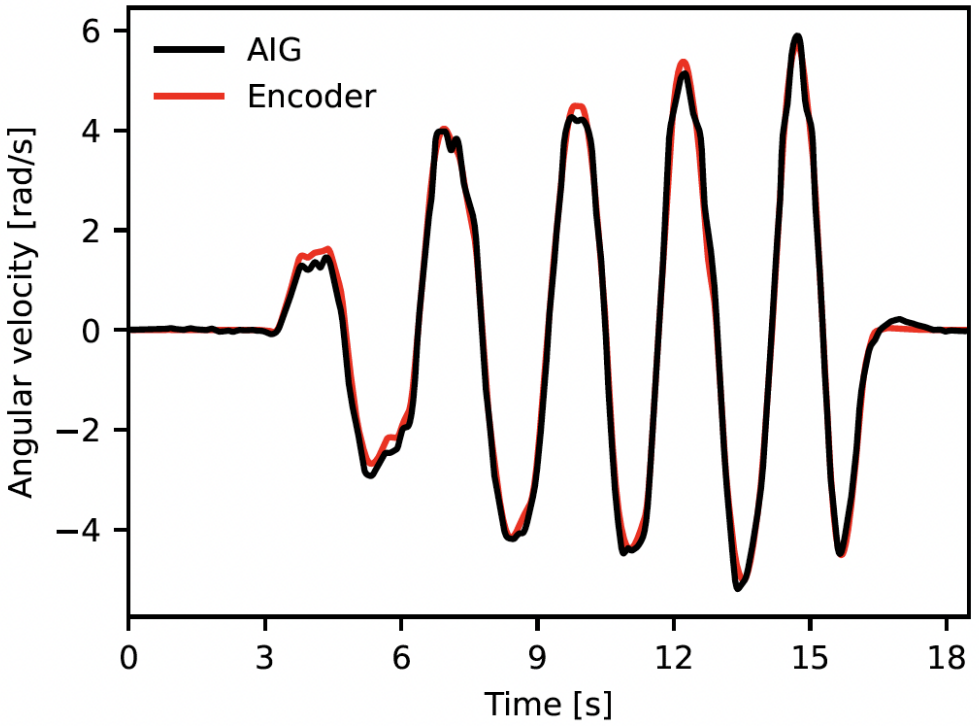
Mach-Zehnder Interferometer



Matterwave interferometer

Demonstration of rotation rate sensitivity



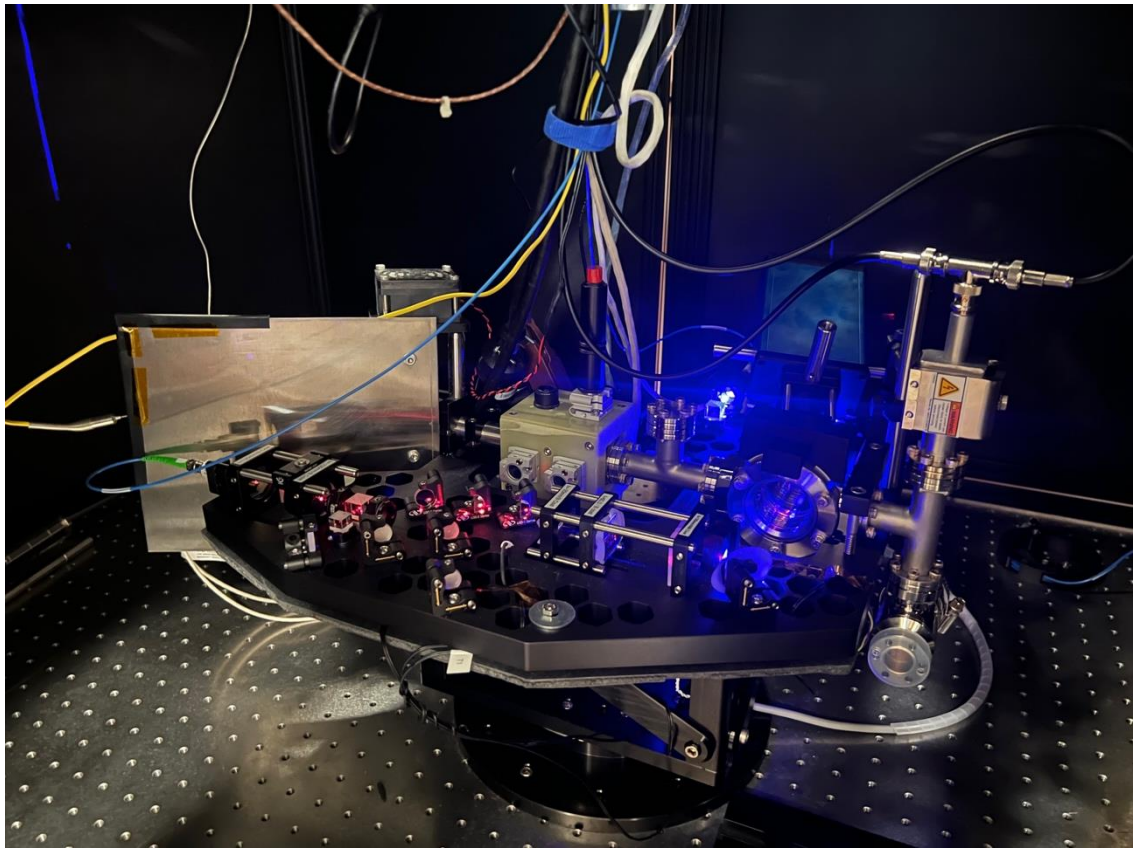


$$\Delta\phi = \frac{4\pi\, m\, \Omega A}{h}$$

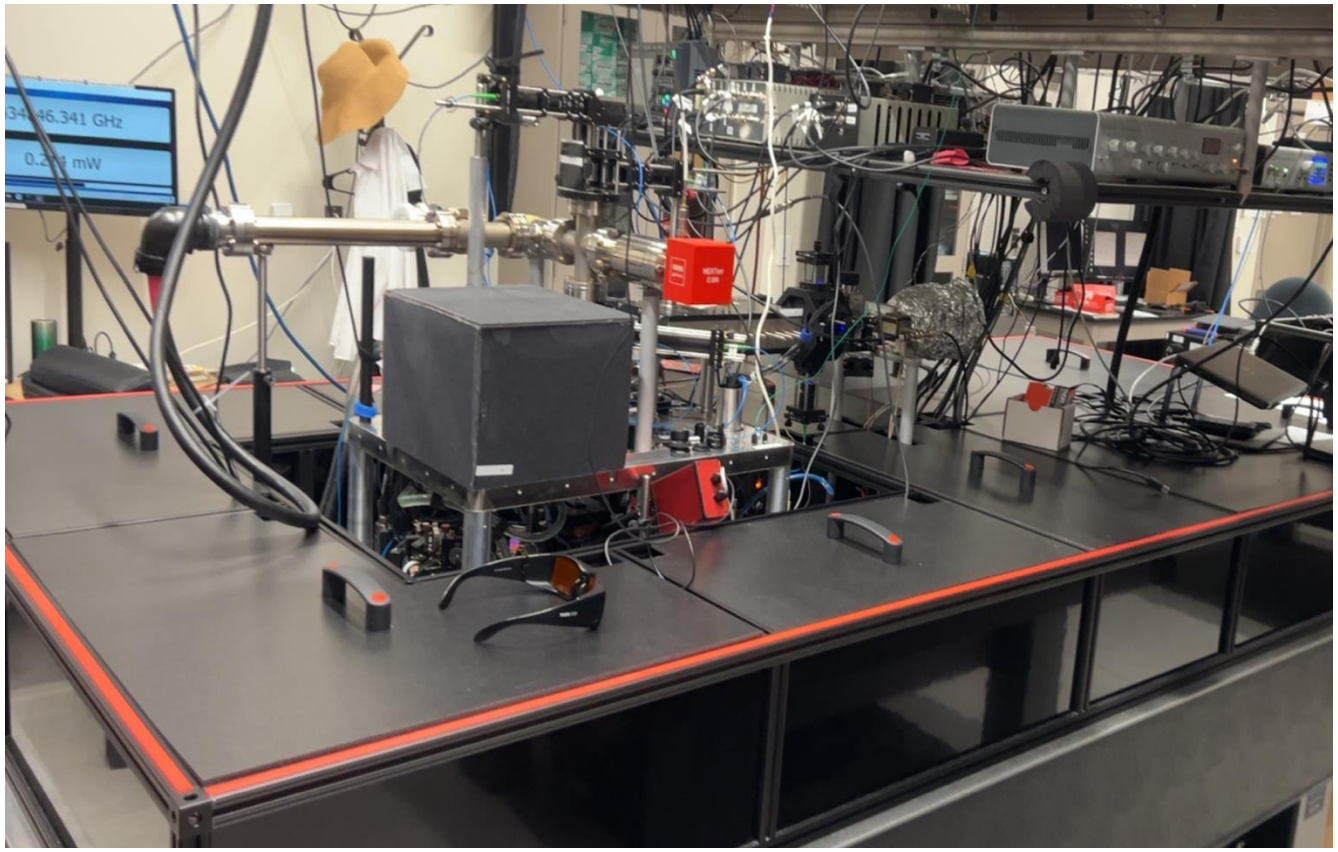
L. A. Kraft, et al, GB, *Phase modulation detection of a strontium atom interferometer gyroscope*, Phys. Rev. Applied 25, 034030 (2026).

Problem

- Two strontium experiments
- Can’t run at the same time

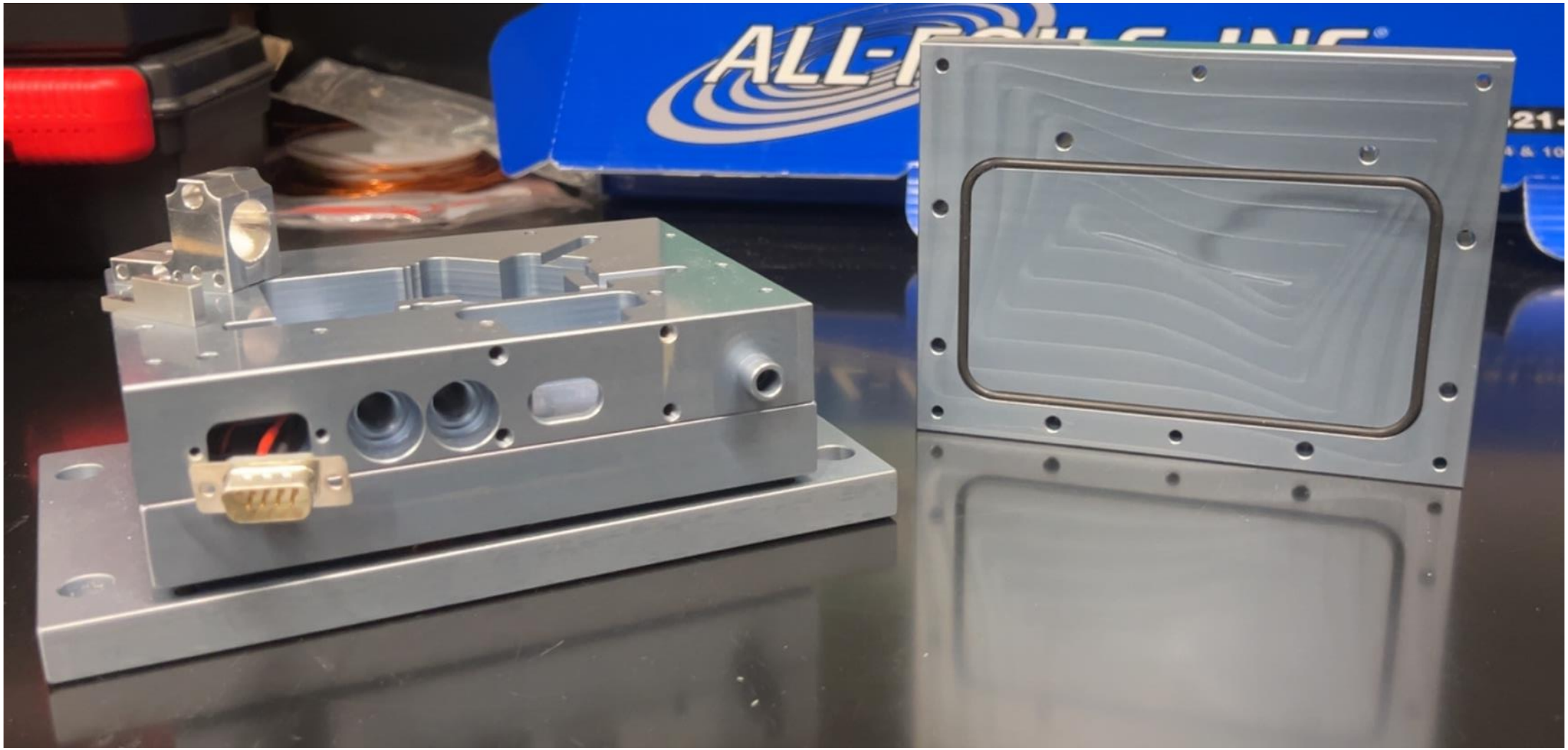


Matterwave interferometer



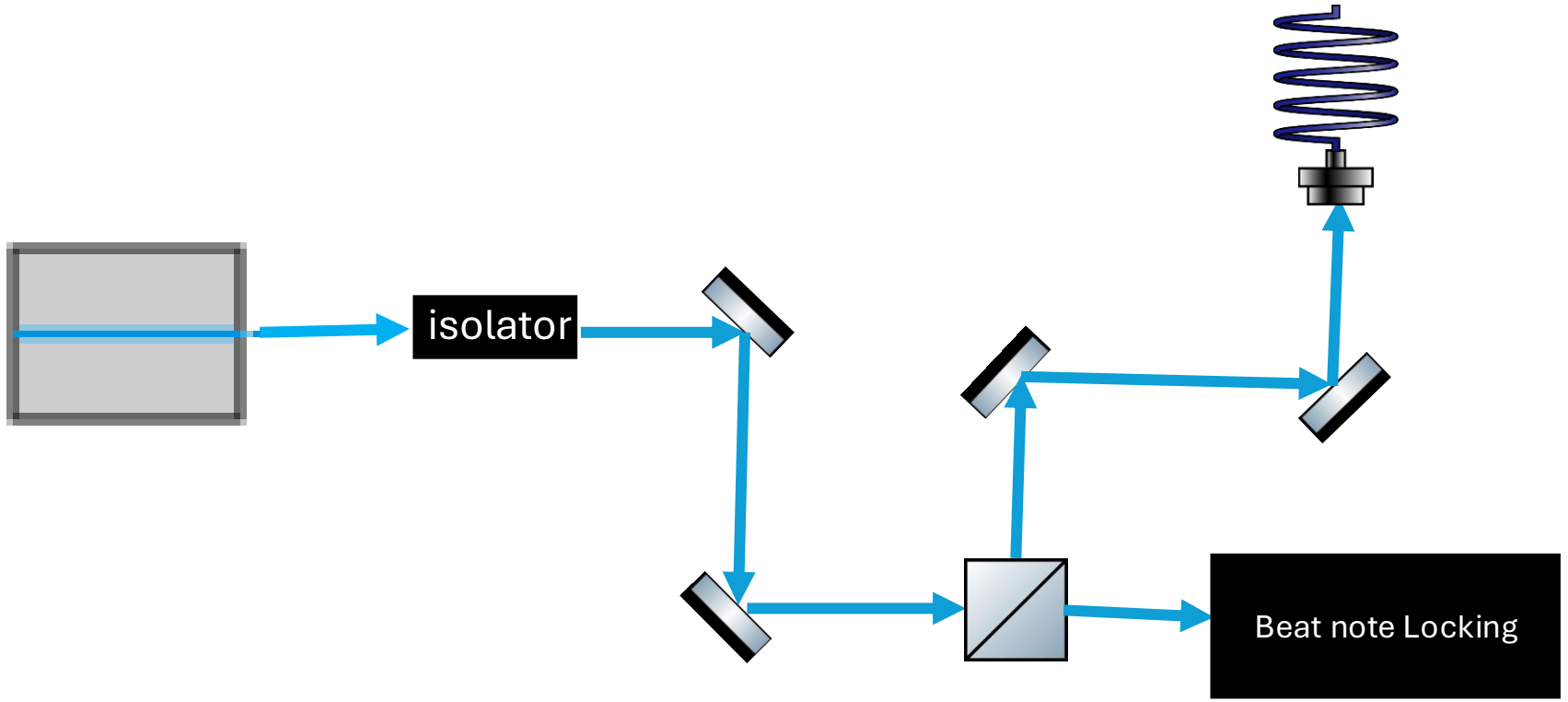
Strontium optical tweezer

My Role



External Cavity Diode Laser (ECDL)

Layout



Convex Lens

Mirror

Polarized Beam Splitter

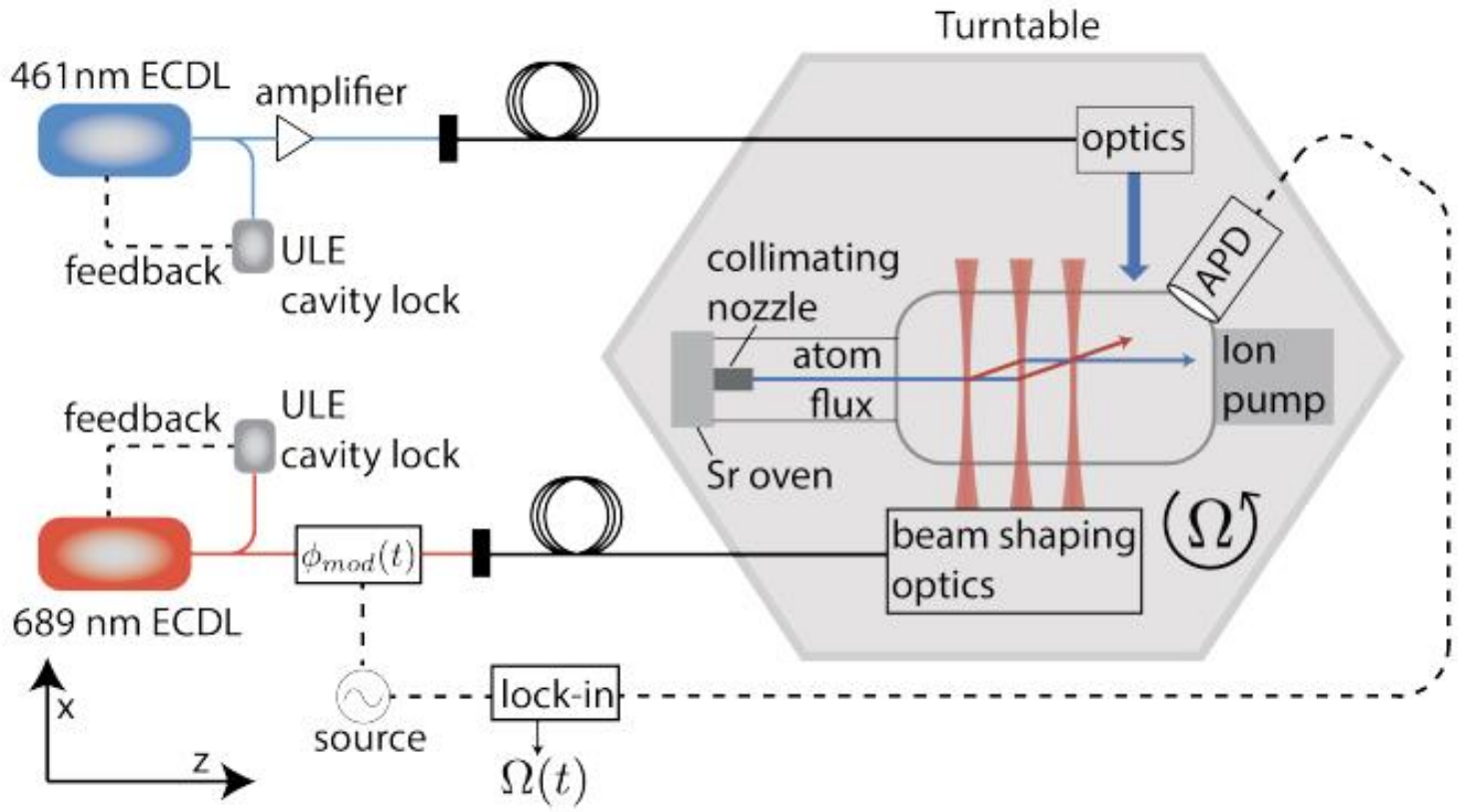
ECDL

Fiber Coupler

Optical Fiber

Conclusion

- Assemble ECDL
- Reading and Learning
- Obtaining and analyzing data



Experiment Overview

Questions?