

# Sandia National Laboratories



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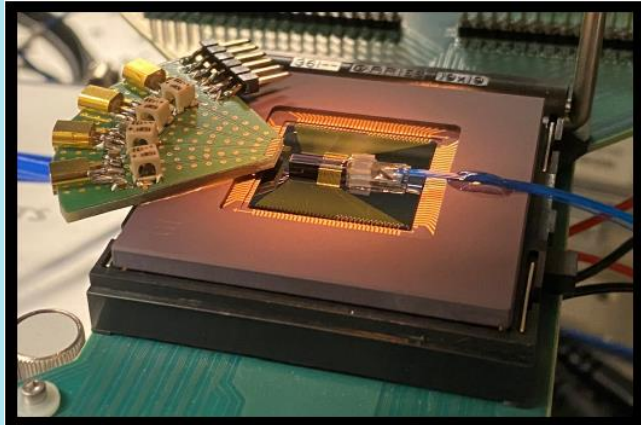
- Expertise: Remote sensing with classical and quantum-based sensors, specializing in magnetic sensing; I am here to represent my staff who develop sensors
- Expectations: Learn about current technology state-of-the-art for underground utility mapping; partnerships with govt. and private industry desirable for tech. maturation and in-ground test/demo opportunities



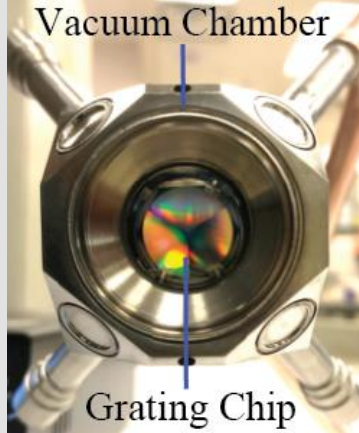
# Sandia National Labs (Dept. 5228) Quantum Sensing



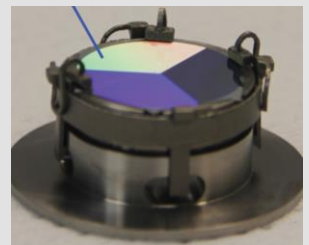
**MEG with optically pumped magnetometers**  
*Borna et al. Plos one 15.1 (2020)*



**Compact, photonic integrated circuit-based laser modulators**  
*Lee et al. Nature Comm. 13:5131 (2022)*

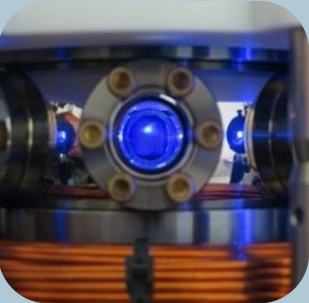


Vacuum Chamber  
Grating Chip

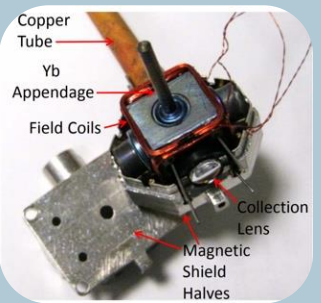


Microfabricated Grating Chip

**Titanium passively pumped vacuum package**  
*Lee et al. Nature Comm. 13:5131 (2022)*

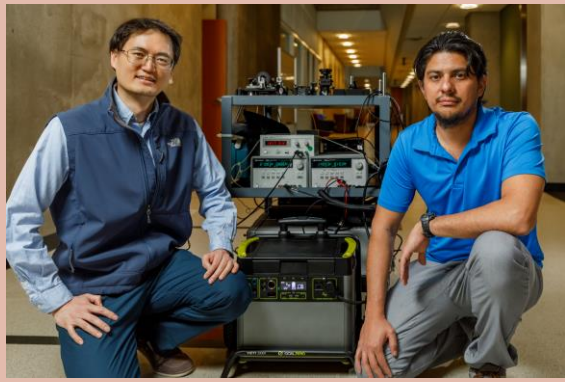


**Sr MOT for optical clock**

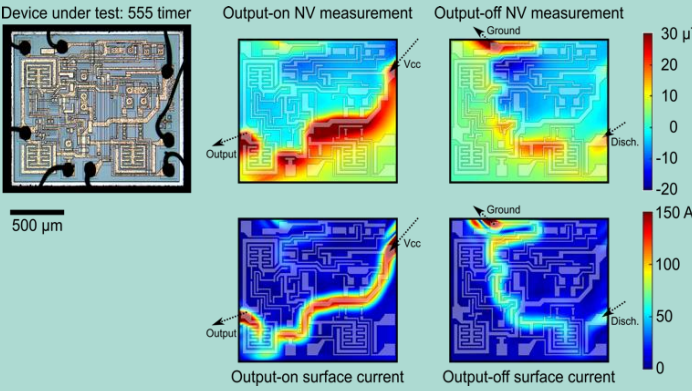


Copper Tube  
Yb Appendage  
Field Coils  
Collection Lens  
Magnetic Shield Halves

**Microwave atomic clock miniature package**



**R. Ding, J. Lee, A. Orozco, & J. Christensen: how to operate cold-atom inertial sensors in dynamic environments**



Device under test: 555 timer

Output-on NV measurement

Output-off NV measurement

Output-on surface current

Output-off surface current

30  $\mu\text{T}$   
20  
10  
0  
-10  
-20

150 A/m  
100  
50  
0

**NV magnetic imaging of electronic circuit behavior**  
*Kehayias et al. Phys. Rev. Applied 17:014021 (2022)*