

# Dr. Rees McNally

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reeslmcnally.github.io

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## EDUCATION

### Columbia University (2015-2020)

Doctorate: Physics  
Master of Science: Physics  
Master of Philosophy: Physics

### University of Colorado (2010-2014)

Bachelor of Science: Applied Mathematics  
Bachelor of Science: Engineering Physics  
Minor: Electrical Engineering

## EXPERIENCE

### Senior Scientist: Optical Engineering @ Areté Associates

*Dec 2020 - Present*

- Technical lead for a Phase-II army SBIR (\$1.1 million) to develop a drone detection system based using high resolution cameras, and machine-vision/ML algorithms. A six member team.
- Principal investigator (PI) for a Phase-I AFRL SBIR (\$150 thousand) to develop an event camera based star-tracker. An improved sensor for satellite navigation.
- PI for an Army contract (\$1.8 million) to develop a tracking and localization system for incoming ordinance using high speed cameras. A ten member team.
- PI for a Phase-I army SBIR (\$260 thousand) for the development ultra-fast optical wavefront sensor to study turbulence. A four member team spanning hardware and software.
- Lead development and deployment of numerous algorithms (sensor fusion, ML classifiers, anomaly detection, etc.) to improve a deployed network of sensors for the DOD.
- Supported early development on numerous other projects/proposals with a total acquisition value of >\$6 million. Reputation as technology innovator for hard problems

### Graduate Teaching Fellow @ Columbia

*Dec 2015 - Dec 2020*

- Developed a new lab to teach script based python data analysis to advanced undergraduates. Involved the measurement of the CMB temperature from a roof in Manhattan.
- Founded and led (2016-2019) an ongoing biweekly graduate student seminar series to help graduate students improve presentation skills, and learn about other disciplines.

### Graduate Research @ Columbia: Professor Tanya Zelevinsky

*Dec 2015 - Dec 2020*

- Led the design and construction of a new machine to laser cool and study molecules. Utilized 10+ diode lasers, custom control software, cryogenics, and UHV systems.
- Proposed a new phenomenological signature for the direct terrestrial detection of dark matter
- Demonstrated a novel chip scale frequency comb based on micro-ring resonator.
- Published 9 peer reviewed articles on a wide variety of topics over my academic career.

### Undergraduate Research

*Aug 2010 - Jun 2015*

- **Professor Jun Ye:** Helped design and impliment a next generation atomic clock, which is currently the most accurate clock in the world.
- **Lawrence Livermore National Lab:** Developed algorithms for data reconstruction from network of quantum sensors using Livermore's HPC cluster's.
- **AFRL/Colorado Space Grant:** Member of Integration and testing team for final spacecraft with AFRL facility prior to launch with SpaceX. Collaborated with aerospace R&D company ASTRA to demonstrate a new method to identify satellites from radar tracking data.

### Outreach

- Industry mentor for the GLEE 2023 student satellite mission, a "citizen science" program to send 500 post-it note sized satellites to teams around the world (2020-2023).

### Skills

- Software: Python, NumPy, SciPy, Pandas, Scikit-Learn, Keras/TF, MATLAB, Mathematica
- Design and alignment of complex optical systems
- Identifying ways to apply cutting edge research to real world problems in a variety of fields.
- Leading teams with disparate skill sets towards common goals.

### Awards

- 2014 CU Boulder's Fall Outstanding Graduate for Research, Graduating Summa Cum Laude
- 2016 "Audience Favorite" at the NYC's famous Abbey Pub mac and cheese competition
- 2017 NSF: IGERT Fellowship Award recipient
- 2019 Allen M Sachs Teaching Award for outstanding graduate student instruction
- 2021 & 2022 Areté New Business Capture Award