# Adrian D. Scheppe

Air Force Institute of Technology
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## Research Interests

Primarily interested in all things related to condensed matter and quantum computation (QC) with a focus on topological states and topological QC. Currently working on modelling Superconductor | Topological Insulator heterostructures, Majorana states, and applications to QC. Additional work includes quantum optical system theory and applications to QC.

## Education

**Air Force Institute of Technology** — Dayton, OH
***Ph.D.*** *in* ***Physics*** — *expected Sept 2023*
*Advisor: Michael Pak*

**Air Force Institute of Technology** — Dayton, OH
***Master of Science*** *in* ***Applied Physics*** — *Mar 2021*
*Advisor: Michael Pak*

**US Air Force Academy** — Colorado Springs, CO
***Bachelor of Science*** *in* ***Physics*** — *May 2019*
Concentration in Mathematical Physics
Minor in German

## Research Experience

**Graduate Student Researcher,** *Advisor: Michael Pak* — August 2019 – Present
*Air Force Institute of Technology* — *Dayton, OH*
- SC—TI heterosctructure and Majorana modelling for robust qubit designs
- Theoretical modelling of PDC entangled photon systems

**Student Researcher,** *Advisor: Francis Chun* — Aug 2018–May 2019
*Center for Space Situational Awareness (CSSAR)* — *Colorado Springs, CO*
- Collected observational data of known satellites and successfully identified via recorded polarization data

**Student Research Intern,** *Advisor: Selim Elhadj* — May 2017–July 2017
*Lawrence Livermore National Laboratory* — *Livermore, CA*
- Assisted with the assembly and maintenance of atomic layer deposition system and collected sample data

## AWARDS, GRANTS, & HONORS

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|---|---|
| Advanced Academic Degree (AAD) Program | Mar 2021 |
| Applied Physics Top Student Award | May 2019 |
| Graduate School Program (GSP) Scholarship | Nov 2018 |
| CSRP Outstanding Research Finalist | Oct 2017 |
| Cadet Summer Research Program (CSRP) Internship | Jan 2017 |
| US Air Force Academy Appointment | June 2015 |
| President's List (4.0 GPA) at Georgia Highlands Community College | Jan 2014-May 2015 |
| Congressional Nomination to USAFA | Oct 2014 |
| Congressional Nomination to USAFA | Oct 2013 |
| Congressional Nomination to USAFA | Oct 2012 |
| Tellus Museum Outstanding Volunteer Award | Aug 2012 |

## Presentations

Ingredients of a Topological Quantum Computer, *Quantum Information Seminar*, Air Force Institute of Technology/ Air Force Research Lab, Dayton, OH, Feb 2021

Braiding Group for Majorana, *Quantum Information Seminar*, Air Force Institute of Technology/ Air Force Research Lab, Dayton, OH, Nov 2020

Characterization of Unresolved Satellite Imagery Using Polarization Data, *2019 Annual Meeting of the APS Four Corners Section*, CSSAR, Prescott, AZ, Oct 2019

Characterization of Unresolved Satellite Imagery Using Polarization Data, *CORONA*, CSSAR, Colorado Springs, CO, Mar 2019

## Publications

**3 total; 1 first author**

1. **Adrian Scheppe**, Michael Pak, "Complete and Compact Description of Fault Tolerant Quantum Gate Operations for Topological Majorana Qubit Systems", 2021, *Manuscript*
2. Pirozzoli, M. F. and Zimmerman, L.A. and Korta, M. and **Scheppe, A.D.** and Chun, F. K. and Plummer, M.K. and Harris, C.N. and Strong, D.M. and Tippets, R.D."Calibration and sensitivity analysis of a basic polarimeter for manmade satellite observations", 2020, *Submitted*
3. John Miller, Cooper Gillespie, John Chesser, **Adrian Scheppe**, Taylor Bryson, Jay Dixon, Art Nelson, Nick Teslich, Andrew Lange, Selim Elhadj, Robert V. Reeves, Surface modification of organic powders for enhanced rheology via atomic layer deposition, *Advanced Powder Technology*, Volume 31, Issue 6, 2020

## Employment

**Physicist** | *U.S. Air Force* May 2019 – Present
- Conduct and manage programs and projects
- Support highly technical operations and intelligence
- DoD Interest Research

**Server** | *Schroeder's New Deli* July 2014 – May 2015
- Served tables

**Server & Cashier** | *Steak n' Shake* Jan 2014 – July 2014
- Served Tables
- Managed Cash Register

## Outreach & Service

**Physics & Math Tutor** | *USAFA Tutor Program, Colorado Springs, CO* August 2016–May 2019
*Provided free undergraduate Physics tutoring to peers 2 hrs/week through official tutoring program*

**Math Tutor** | *AfterMath, Monument, CO* August 2017–May 2019
*Provided free Math (and occasionally Physics) tutoring to K-12 for 3 hrs/week*

**Squadron Academics Officer** | *USAFA, Colorado Springs, CO* Aug 2018–May 2019
*Provided continual academics related resources and assistance to over 100 students*
*Provided special assistance to at risk GPA students so that they were not disenrolled*

**Squadron Volunteering Coordinator** | *USAFA, Colorado Springs, CO* August 2017–May 2018
*Planned and coordinated two major volunteering efforts for over 100 cadets*
*Colorado Springs Fire Department Fire Safety Awareness*

*Manitou Springs Nature Trail restoration project*

**Volunteer** | *Tellus Science Museum, Cartersville, GA* August 2013–May 2015

*Volunteered for approx. 6 hours/ month engaging general public in hands on natural science exhibits (Solar House, Fossil Dig, Planetarium Shows, Observatory)*

## Computational Skills

- Arduino & Raspberry Pi
- Python
- MATLAB
- LaTeX

## Scholarly Memberships

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| Eta Kappa Nu | Member |
| Tau Beta Pi | Member |
| Phi Theta Kappa | Member |