

William J. Oldroyd

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EDUCATION

Northern Arizona University (NAU)
Astronomy and Planetary Science, MS, PhD

Aug 2018 – Aug 2022
Flagstaff, AZ

Brigham Young University (BYU)
Physics-Astronomy, BS; Minors: Mathematics, Spanish, Geology

Aug 2010 – Dec 2011 & Apr 2014 – Apr 2018
Provo, UT

SCHOLARSHIPS, GRANTS, AND AWARDS (7 of 23)

- NAU Graduate Student Government Poster Symposium Competition, 2nd Place Poster 2021
- NAU Graduate Student Government Conference Presentation Competition Session Winner 2021
- American Astronomical Society Division for Planetary Sciences Hartmann Student Travel Grant 2020
- American Astronomical Society Division on Dynamical Astronomy Student Registration Grant 2020
- NAU 3 Minute Research Presentation “Most Surprising Research”/Peoples’ Choice Award 2019
- BYU Office of Research and Creative Activities Student Research Grant 2016-2017
- BYU Physics Departmental Scholarship 2016-2017

PUBLICATIONS

Refereed (7)

- **Oldroyd, W.**; Robinson, T., “*Orbit Determination Optimization for Directly Imaged Exoplanets*,” in prep
- Chandler, C.; Grundy, W.; **Oldroyd, W.**; Trujillo, C.; Kueny, J.; Thirouin, A., “*A Widely Separated Transition TNO Binary*,” in prep
- Trujillo, C.; Trilling, D.; Gerdes, D.; Fuentes, C.; Jurić, M.; Lin, E.; Markwardt, L.; McNeill, A.; Sheppard, S.; Holman, M.; Mommert, M.; **Oldroyd, W.**; Payne, M.; Ragozzine, D.; Rivkin, A.; Schlichting, H.; Smotherman, H.; Strauss, R.; Napier, K.; Beach, C.; Gowman, G.; Pan, J.; Simpson, A.; Stetzler, S., “*Observing Strategy for the DECam Ecliptic Exploration Project: DEEP*,” in prep
- Chandler, C. O.; **Oldroyd, W. J.**; Trujillo, C. A., “*A Migratory Outbursting Quasi-Hilda Object*,” submitted to ApJL
- Pravec, P.; Thomas, C. A.; Rivkin, A. S.; Scheirich, P.; Moskovitz, N.; Knight, M. M.; Snodgrass, C.; de León, J.; Licandro, J.; Popescu, M.; Thirouin, A.; Föhning, D.; Chandler, C. O.; **Oldroyd, W. J.**; Trujillo, C. A.; Howell, E. S.; Green, S. F.; Thomas-Osip, J.; Sheppard, S. S.; Farnham, T. L.; Mazzotta Epifani, E.; Dotto, E.; Ieva, S.; Dall’Ora, M.; Kokotanekova, R.; Carry, B.; Souami, D., “*Photometric observations of the binary near-Earth asteroid (65803) Didymos in 2015-2021 in support of the DART space mission*,” PSJ, 3, id.175, Jul 2022
- **Oldroyd, W. J.**; Trujillo, C. A., “*Outer Solar System Perihelion Gap Formation Through Interactions with a Hypothetical Distant Giant Planet*,” AJ, 162, id.39, Aug 2021
- Chandler, C. O.; Kueny, J. K.; Trujillo, C. A.; Trilling, D. E.; **Oldroyd, W. J.**, “*Cometary Activity Discovered on a Distant Centaur: A Non-Aqueous Sublimation Mechanism*,” ApJL, 892, L38, Apr 2020

Non-Refereed (61)

- Gerdes, D.; Napier, K.; Lin, H.-W.; Trilling, D.; Juric, M.; Adams, F.; Smotherman, H.; Trujillo, C.; Simpson, A.; Porter, M.; Bernardinelli, P.; Strauss, R.; Gowman, G.; Sheppard, S.; **Oldroyd, W.**; Fuentes, C., “*DEEP Drilling into the Kuiper Belt: First Results from the DECam Ecliptic Exploration Project*,” AAS 240, id. 227.05, Jun 2022
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**; Chandler, C.; Tholen, D. J., “*2021 DH17*,” MPEC, 2022-K183, May 2022

- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**; Chandler, C.; Tholen, D. J., “2021 CP40,” MPEC, 2022-K182, May 2022
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**; Tholen, D. J., “2020 BF102,” MPEC, 2022-K181, May 2022
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**; Chandler, C.; Tholen, D. J., “2021 DG17,” MPEC, 2022-K180, May 2022
- Trujillo, C.; Sheppard, S. S.; **Oldroyd, W. J.**; Chandler, C.; Tholen, D. J., “2020 FR40,” MPEC, 2022-K179, May 2022
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**; Chandler, C.; Tholen, D. J., “2020 FQ40,” MPEC, 2022-K178, May 2022
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**; Chandler, C.; Tholen, D. J., “2020 FP40,” MPEC, 2022-K174, May 2022
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**; Chandler, C., “2021 LL37,” MPEC, 2022-K173, May 2022
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**; Chandler, C.; Tholen, D. J., “2020 BE102,” MPEC, 2022-K172, May 2022
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**; Tholen, D. J.; Deen, S., “2021 DF17,” MPEC, 2022-J106, May 2022
- **Oldroyd, W.**; Robinson, T., “*A Statistical Approach to Optimizing Orbit Constraints for Directly Imaged Exoplanets*,” DDA 53, id. 401.03, Apr 2022
- Trujillo, C.; Sheppard, S. S.; **Oldroyd, W.**; Tholen, D. J., “2020 BY101,” MPEC, 2022-G191, Apr 2022
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**; Tholen, D. J.; Gibson, B.; Goggia, T.; Primak, N.; Schultz, A.; Willman, M.; Chambers, K.; Chastel, S.; Chen, Y.-T.; Denneau, L.; Flewelling, H.; Holman, M.; Huber, M.; Jedicke, R.; Lackner, M.; Lilly, E.; Lin, H.-W.; Magnier, E.; Micheli, M.; Payne, M.; Veres, P.; Wainscoat, R.; Waters, C.; Weryk, R., “2015 AH281,” MPEC, 2021-Y32, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**; Tholen, D. J., “2021 DS15,” MPEC, 2021-Y30, Dec 2021
- Trujillo, C.; Sheppard, S. S.; **Oldroyd, W.**; Tholen, D. J., “2020 BC95,” MPEC, 2021-Y29, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**; Tholen, D. J., “2021 DR15,” MPEC, 2021-Y28, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**; Tholen, D. J., “2021 DO15,” MPEC, 2021-Y25, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**, “2019 GZ129,” MPEC, 2021-Y24, Dec 2021
- Trujillo, C.; Sheppard, S. S.; **Oldroyd, W.**; Tholen, D. J., “2019 EV5,” MPEC, 2021-Y23, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**, “2020 VL26,” MPEC, 2021-Y21, Dec 2021
- Trujillo, C.; Sheppard, S. S.; **Oldroyd, W.**; Tholen, D. J., “2020 BA95,” MPEC, 2021-Y20, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**; Tholen, D. J., “2019 EU5,” MPEC, 2021-Y19, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W. J.**; Tholen, D. J., “2019 ET5,” MPEC, 2021-Y18, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**; Tholen, D. J., “2021 DN15,” MPEC, 2021-Y17, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**, “2019 SH187,” MPEC, 2021-Y16, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**; Tholen, D. J., “2021 DM15,” MPEC, 2021-Y09, Dec 2021
- Sheppard, S. S.; Tholen, D. J.; Trujillo, C.; **Oldroyd, W. J.**, “2020 FQ38,” MPEC, 2021-Y08, Dec 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**; Tholen, D. J., “2020 BZ94,” MPEC, 2021-Y06, Dec 2021
- **Oldroyd, W. J.**; Trujillo, C. A., “*Using the Outer Solar System Perihelion Gap as a Constraint for Planet X*,” DPS 53, id.310.05, Oct 2021
- Chandler, C. O.; Trujillo, C. A.; Kueny, J. K.; **Oldroyd, W. J.**; Hsieh, H. H., “*Active Asteroids Citizen Science*,” DPS 53, id.507.04, Oct 2021
- Trilling, D.; Gerdes, D.; Fuentes, C.; Juric, M.; Lin, E.; Markwardt, L.; McNeill, A.; Sheppard, S.; Trujillo, C.; Holman, M.; Mommert, M.; **Oldroyd, W.**; Payne, M.; Ragozzine, D.; Rivkin, A.; Schlichting, H.; Smotherman, H.; Strauss, R.; Napier, K.; Beach, C.; Gowman, G.; Pan, J.; Simpson, A.; Stetzler, S., “*Year 3 of the DECam Ecliptic Exploration Project (DEEP)*,” DPS 53, id.202.04, Oct 2021

- **Oldroyd, W. J.**; Trujillo, C. A., “*Planet X Can Cause the Outer Solar System Perihelion Gap*,” DDA 52, id. 502.04, Jun 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**, “2019 SS149,” MPEC, 2021-D88, Feb 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**, “2020 BR60,” MPEC, 2021-D85, Feb 2021
- Sheppard, S. S.; Trujillo, C.; **Oldroyd, W.**, “2019 SW148,” MPEC, 2021-C298, Feb 2021
- Sheppard, S. S.; Trujillo, C.; Tholen, D. J.; **Oldroyd, W. J.**, “2020 FB31,” MPEC 2021-C297, Feb 2021
- Sheppard, S. S.; Tholen, D. J.; Trujillo, C.; **Oldroyd, W. J.**, “2020 FA31,” MPEC, 2021-C289, Feb 2021
- Sheppard, S. S.; Tholen, D. J.; Trujillo, C.; **Oldroyd, W. J.**, “2020 FY30,” MPEC, 2021-C282, Feb 2021
- **Oldroyd, W.**; Robinson, T., “*Maximizing Orbital Constraints for Directly Imaged Exoplanets*,” AAS 237, id. 516.03, Jan 2021
- Kelley, M. S. P.; Hsieh, H. H.; Chandler, C. O.; Eggl, S.; Holt, T. R.; Jones, L.; Juric, M.; Lister, T. A.; Moeyens, J.; **Oldroyd, W. J.**; Ragozzine, D.; Trilling, D. E., “*Community Challenges in the Era of Petabyte-Scale Sky Surveys*,” BAAS 53, e-id. 495, May 2021 & arXiv:2011.03584, Nov 2020
- **Oldroyd, W. J.**; Trujillo, C. A., “*Outer Solar System Perihelion Gap Formation through Perturbations from an Undiscovered Giant Planet*,” DPS 52, id.304.04, Oct 2020
- Chandler, C. O.; Kueny, J. K.; Trujillo, C. A.; Trilling, D. E.; **Oldroyd, W. J.**, “*Cometary Activity Discovered on Centaur 2014 OG392*,” DPS 52, id.404.02, Oct 2020
- Vera C. Rubin Observatory LSST Solar System Science Collaboration; Jones, R. L.; Bannister, M. T.; Bolin, B. T.; Chandler, C. O.; Chesley, S. R.; Eggl, S.; Greenstreet, S.; Holt, T. R.; Hsieh, H. H.; Ivezić, Z.; Jurić, M.; Kelley, M. S. P.; Knight, M. M.; Malhotra, R.; **Oldroyd, W. J.**; Sarid, G.; Schwamb, M. E.; Snodgrass, C.; Solonoi, M.; Trilling, D. E., “*The Scientific Impact of the Vera C. Rubin Observatory’s Legacy Survey of Space and Time (LSST) for Solar System Science*,” BAAS 53, e-id.236, May 2021 & arXiv:2009.07653, Sep 2020
- **Oldroyd, W. J.**; Trujillo, C. A., “*Constraining the Outer Solar System Perihelion Gap*,” DDA 51, id.501.04, Aug 2020
- Sheppard, S. S.; Tholen, D. J.; Trujillo, C.; **Oldroyd, W. J.**, “2015 VX184,” MPEC, 2020-L18, Jun 2020
- **Oldroyd, W. J.**; Robinson, T., “*Orbital Solutions for Revisit Optimization of Directly Imaged Exoplanets*,” AAS 235, id. 320.04, Jan 2020
- Trujillo, C.; Trilling, D.; Gerdes, D.; Holman, M.; Markwardt, L.; Sheppard, S.; Fuentes, C.; Juric, M.; Lin, E.; McNeill, A.; Mommert, M.; **Oldroyd, W.**; Payne, M.; Ragozzine, D.; Rivkin, A.; Schlichting, H.; Schwamb, M., “*Deep Ecliptic Exploration Project (DEEP) Observing Strategy*,” EPSC-DPS2019-2070, Sep 2019
- **Oldroyd, W.**; Trujillo, C., “*The Outer Solar System Perihelion Gap*,” EPSC-DPS2019-1255-1, Sep 2019
- Trilling, D.; Gerdes, D.; Trujillo, C.; Sheppard, S.; Fuentes, C.; Schlichting, H.; McNeill, A.; Juric, M.; Holman, M.; Lin, E.; Markwardt, L.; Mommert, M.; **Oldroyd, W.**; Payne, M.; Ragozzine, D.; Rivkin, A.; Schwamb, M., “*The Deep Ecliptic Exploration Project (DEEP): A new NOAO survey of the faint outer Solar System*,” EPSC-DPS2019-395-1, Sep 2019
- **Oldroyd, W. J.**; Trujillo, C., “*Computationally and Observationally Constraining the Outer Solar System Perihelion Gap to Help Find Planet X*,” DDA 50, id.201.01, Jun 2019
- Trujillo, C. A.; Sheppard, S. S.; **Oldroyd, W. J.**, “2017 VO34,” MPEC, 2019-F101, Mar 2019
- Sheppard, S. S.; Trujillo, C. A.; **Oldroyd, W. J.**; Tholen, D. J., “2018 AX18,” MPEC, 2019-C98, Feb 2019
- Trujillo, C. A.; Sheppard, S. S.; Thirouin, A.; **Oldroyd, W. J.**, “2017 WH30,” MPEC, 2019-C97, Feb 2019
- Sheppard, S. S.; Trujillo, C. A.; **Oldroyd, W. J.**; Tholen, D. J., “2017 SN132,” MPEC, 2019-C96, Feb 2019
- Trujillo, C. A.; Sheppard, S. S.; **Oldroyd, W. J.**; Tholen, D. J.; Thirouin, A., “2017 OG69,” MPEC, 2019-C95, Feb 2019
- Sheppard, S. S.; Trujillo, C. A.; **Oldroyd, W. J.**; Tholen, D. J.; Williams, G. V., “2018 VG18,” MPEC, 2018-Y14, Dec 2018
- **Oldroyd, W. J.**; Ragozzine, D.; Porter, S., “*More Sophisticated Fits of the Orbits of Haumea’s Interacting Moons*,” DDA 49, id. 402.03, Apr 2018
- **Oldroyd, W. J.**; Radebaugh, J.; Stephens, D.; Lorenz, R. D.; Harvey, R. P.; Karner, J., “*Modeling Meteorite*

Heat Transfer in an Antarctic Environment,” LPSC 49, id.2794, Mar 2018

- **Oldroyd, W. J.**; Radebaugh, J.; Stephens, D. C.; Lorenz, R.; Harvey, R.; Karner, J., “*Modeling the Thermal Interactions of Meteorites Below the Antarctic Ice,*” DPS 49, id.113.01, Oct 2017
- **Oldroyd, W. J.**; Radebaugh, J., “*Searching for a Hidden Population of Iron Meteorites Below the Antarctic Ice,*” LPSC 48, id.2967, Mar 2017

RESEARCH EXPERIENCE

NAU Graduate Research

- Large Scale Survey for Extreme Trans-Neptunian Objects Aug 2018 – Present
 - Recovered newly discovered outer solar system objects using the LDT and Magellan telescopes
 - Observed survey fields using DECam
- DECam Ecliptic Exploration Project (DEEP) Sep 2018 – Present
 - Developed characteristic survey sky pattern
 - Carried out survey observations with DECam
- Orbital Solutions for Revisit Optimization of Directly Imaged Exoplanets Dec 2018 – Present
 - Developed a model for maximizing orbit determination efficiency per observation
- Legacy Survey of Space and Time Solar System Science Collaboration Oct 2019 – Present
 - Co-authored two white papers for the Planetary Science and Astrobiology Decadal Survey
 - Collaborated on cadence recommendations for Vera C. Rubin Observatory
- Searching for Cometary Activity on Small Solar System Bodies Dec 2019 – Present
 - Observed asteroids and Centaurs searching for signs of comet-like activity using the LDT, Magellan, VATT, Gemini South, and LBT (PI)
- Searching for Surface Features on Large Trans-Neptunian Objects Apr 2020 – Present
 - Observed large TNOs using the LBT (PI) and the VATT
- The Outer Solar System Perihelion Gap Aug 2018 – Aug 2021
 - Modeled gravitation effects of Planet X on the outer solar system using N-body simulations
 - Utilized a variety of statistical tests and modeling to determine significance of the perihelion gap
- Detailed Photometry of Didymos for the DART Mission Jul 2021 – Aug 2021
 - Reduced Gemini data using IRAF and produced high precision photometry with AstroImageJ
- Asteroid Family Spectral Slope Modeling to Constraining Space Weathering Rates Dec 2018 – Aug 2020
 - Developed space weathering models using Markov Chain Monte Carlo statistical techniques

BYU Undergraduate Research

- Modeling the Thermal Interactions of Meteorites Below the Antarctic Ice Dec 2014 – Apr 2018
 - Analyzed solar flux and temperature field data and modeled meteorite migration through the ice
- Using Modeling to Improve Methods for Teaching Basic Electrostatics Dec 2014 – Apr 2018
 - Developed and tested physical models for visually representing electrostatics principles
- Modeling the Orbital Parameters of the Haumea System Jul 2017 – Aug 2018
 - Utilized statistical fitting to find precise fits for orbital parameters with Hubble Space Telescope data

TELESCOPE OBSERVING EXPERIENCE

- Large Binocular Cameras (Red and Blue), 2 x 8.4m Large Binocular Telescope, Large Binocular Telescope (LBT) Observatory, Arizona, USA, remote queue
- Gemini Multi-Object Spectrograph Imager, 8.1m Gemini South Telescope, Gemini Observatory, Chile, remote queue
- Inamori Magellan Areal Camera and Spectrograph, 6.5m Walter Baade Magellan Telescope, Las Campanas Observatory, Chile, on site and remote
- Large Monolithic Imager, 4.3m Lowell Discovery Telescope (LDT), Lowell Observatory, Arizona, USA, on site and remote
- Dark Energy Camera (DECam), 4m Víctor Blanco Telescope, Cerro Tololo Inter-American Observatory, Chile, remote
- Vatt4k, 1.8m Vatican Advanced Technology Telescope (VATT), Mount Graham International Observatory, Arizona, USA, on site observer and operator
- 0.5m Barry Lutz Telescope, Atmospheric Research Observatory, Northern Arizona University, Arizona, USA, on site
- 0.4m David Derrick Telescope, Orson Pratt Observatory, Brigham Young University, Utah, USA, on site

HIGH PERFORMANCE COMPUTING AND PROGRAMMING EXPERIENCE

- Utilized over 2 million compute hours on the NAU High Performance Computing Cluster, *Monsoon*, for orbital dynamics simulations, space weathering models, exoplanet lightcurve extraction, and parallel computing metric testing
- Programming languages used in research: Python, C, C++, bash, IDL, IRAF, MATLAB, awk, VBA, Mathematica

TEACHING EXPERIENCE

NAU Mentoring

- Interns to Scholars Mentor Jul 2020 – May 2022
 - Co-mentored a beginning undergraduate in a hands on computational research project focused on searching for exoplanets in data from NASA's Transiting Exoplanet Survey Satellite mission
- Summer Research Experience for Undergraduates Mentor Jun 2020 – Aug 2020
 - Co-mentored an upper level undergraduate on Constraining the Space Weathering Rate with Asteroid Family Spectral Slope Modeling using NAU's HPC cluster

TRiO Upward Bound Teaching

- Summer Residential Program Instructor Jul 2020, 2021, & 2022
 - Developed curriculum and taught courses on Solar System Exploration and Planet Detection Techniques to high school students from diverse backgrounds, cultures, and academic levels
- South Mountain Community College Saturday Academy Instructor Jan – May 2021 & 2022
 - Developed curriculum and taught courses in Applied Physics and The Science of Natural Disasters to high school students from diverse backgrounds, cultures, and academic levels who are potential first generation college students

BYU Teaching

- Teaching Assistant Dec 2014 – Dec 2017
 - Assisted students in walk-in laboratory with 100-500 level physics labs
 - Repaired, improved and installed equipment for all physics labs in the department
 - Taught Physics 107, a non-physics major lab course

- Support TA over data reduction and analysis using IRAF and AstroImageJ for Physics 329, an upper level observational astronomy course

Tutoring

- Private High School Physics Tutor Sep 2016 – Dec 2016
 - Assisted a student with conceptual understanding and homework

COLLOQUIA AND OUTREACH PRESENTATIONS (8)

- Scientist Skype Day, Hillside Avenue School, Feb 25, 2022
- Carnegie Institution of Washington Earth and Planets Laboratory Astronomy Seminar, Oct 22, 2021, “Placing Constraints on Planet X”
- Efigie Educação E Cultrua (Brazil) Mock Class Program, May 10, 2021, “How to Discover a Planet”
- Phoenix Astronomical Society, Mar 4, 2021, “The Search for Planet X”
- West Valley Astronomy Club, Feb 2, 2021, “The Search for Planet X”
- Flagstaff Festival of Science In-School Speaker Program, Oct 22, 2020, “A Hidden Planet in our Solar System”
- Saguaro Astronomy Club & East Valley Astronomy Club, Sep 4, 2020, “The Search for Planet X”
- Prescott Astronomy Club, Oct 17, 2019, “Exploring the Gap Beyond the Kuiper Belt: Implications for Planet X”

ASTRONOMY SERVICE

- AAS DDA Equity, Diversity, and Inclusion Year-round Mentoring Program Committee Member and Mentor Jul 2021-Present
- NAU Astronomy and Planetary Science Graduate Student Faculty Representative Jul 2021 - Aug 2022
- AAS DDA meeting Session Chair Apr 2022
- AAS DPS meeting Science Chat Moderator, Oct 2020 and 2021
- AAS Chambliss Astronomy Achievement Student Awards Poster Competition Judge Jan 2021
- NAU Astronomy and Planetary Science Fellowship Mock Review Panel Panelist Jan 2019, 2020, and 2021
- Local Host for the LSST Solar System Science Collaboration Virtual Solar System Readiness Sprint Conference Jun 2020

EXTRACURRICULAR, AND VOLUNTEER EXPERIENCE

- NAU Department of Astronomy and Planetary Science Grad Student Club Oct 2020 – Dec 2021
 - Vice President - coordinated events, organization, and club founding
- Volunteer Boy Scout Leader Dec 2004 – Dec 2018
 - Eagle Scout
 - Merit Badge Counselor for Astronomy and Chess
- BYU Astronomy Research Group Leader Sep 2016 – Dec 2016
 - Planned and oversaw weekly department wide meetings and invited guest speakers
- BYU Marching Band and Basketball Pep Band 1st Trombone Jul 2010-Dec 2011 & Jul 2014 – Mar 2015
 - Performed at an elite level for tens of thousands of people at televised sporting events
 - Co-organized the largest marching band competition in Utah
- Volunteer Representative for the Church of Jesus Christ of Latter-day Saints Mar 2012 – Mar 2014

- Spanish speaking Missionary in Wisconsin
- Taught English classes for Hispanic minority groups
- Taught workshops on leadership, goal setting, and teaching
- Volunteered at hospitals and food pantries
- BYU Student Association Chess Club President
 - Organized and competed in intercollegiate chess tournaments
 - Planned and oversaw weekly activities and community outreach

Jan 2011 – Dec 2011