

## Curriculum Vitae [last 7 years] — Patrick Brian Hall

Professor, York University

August 24, 2022

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**Mailing address:** Department of Physics & Astronomy, York University, 4700 Keele St., Toronto, ON M3J 1P3, Canada

### Degrees

- Ph.D. Astronomy, University of Arizona, Dept. of Astronomy, January 1998  
Thesis: *An Optical/Infrared Study of Radio-Loud Quasar Environments*  
Advisor: Dr. Richard F. Green
- B.A. Astronomy, University of California at Berkeley, Dept. of Astronomy, May 1990
- B.A. Physics, University of California at Berkeley, Dept. of Physics, May 1990

### Employment History

- 07/20-present     **Chair**, Department of Physics and Astronomy, York University
- 07/20-6/21        Biophysics Program Director, Department of Physics and Astronomy, York University
- 07/16-present    Professor and Member of the Faculty of Graduate Studies, Department of Physics and Astronomy, York University
- 07/14-06/17, 07/19-06/20 Undergraduate Program Director, Dept. of Physics and Astronomy, York University
- 07/09-06/16     Associate Professor and Member of the Faculty of Graduate Studies, Department of Physics and Astronomy, York University
- 07/04-06/09     Assistant Professor and Member of the Faculty of Graduate Studies, Department of Physics and Astronomy, York University
- 10/03-06/04     Research Associate, Department of Astrophysical Sciences, Princeton University
- 10/00-9/03       Research Associate, Princeton University Observatory, Princeton University; and Investigador Asociado, Depto. de Astronomía, P. Universidad Católica de Chile
- 1/98-9/00        Post-Doctoral Fellow, Department of Astronomy, University of Toronto
- 6/94-12/97       Graduate Research Assistant, Department of Astronomy, University of Arizona
- 9/93-5/94        Graduate Teaching Assistant, Department of Astronomy, University of Arizona
- 9/90-8/93        Graduate Research Assistant, Department of Astronomy, University of Arizona

6/89-8/89 Summer Undergraduate Research Assistant, Department of Physics and Astronomy,  
University of Wyoming

### **Awards, Academic Honours, and Other Recognition**

- York University Faculty of Science & Engineering Established Researcher Award, 2011
- York University Merit Award Recipient (\$2,000 in 2007, 2008, 2009, and 2012)
- Asteroid 153686 Pathall (discovered in 2001) named after me
- National Science Foundation Graduate Fellowship (1991-1993, 1995-1996)
- University of Arizona Graduate Fellowship (1990-1991)
- High Distinction in General Scholarship (summa cum laude) at U.C. Berkeley (1990)
- Regents' and Chancellors' Scholar, University of California, Berkeley (1986-1990)

### **External Research Funding**

9/18-2/19 NSERC Engage Grant *Integrating an Analytical Business Intelligence Module into the Medical Confidence Machine Learning System* (\$24,977)

**5/17-4/23 NSERC Discovery Grant *Constraining the Properties of Quasars and their Outflows Using Variability*** (\$125,000 + \$25,000 from one-year COVID-19 extension)

5/12-4/17 NSERC Discovery Grant *Understanding Quasar Outflows* (\$160,000)

7/09-6/14 Ontario Early Researcher Award *Outflows from disks of matter orbiting supermassive black holes* (\$100,000, matched with \$50,000 from York University)

### **Internal Research Funding**

3/19-8/19 York University Faculty of Science Minor Research Grant, 2019 (\$4,190)

4/18-4/18 York University Faculty of Science Minor Research Grant, 2018 (\$200,000 for membership in the Sloan Digital Sky Survey V)

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## Scholarly Activities and Service

- **Principal Investigator, approved 2022-A Canada-France-Hawaii Telescope proposal**  
*Photometric Monitoring for a Multi-Object AGN Reverberation Mapping Campaign in SDSS-V*
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- **Co-Principal Investigator, Canada Foundation for Innovation 2023 Innovation Fund Proposal** *Positioning Canada for Leadership in Next-Generation Spectroscopic Sky Surveys* (~\$7,000,000), March 2021 - present. As Co-PI with Dr. Solomon Tesfamariam (UBC Civil Engineering), I am leading the streamlining and updating of the proposal in collaboration with 5 other key team members across 7 universities in total.
- **Co-Investigator, James Webb Space Telescope Cycle 1 approved observing program A** *JWST Study of the Link Between Supermassive Black Holes and Galaxies at Cosmic Noon, March 2021 (PI: Dr. Yue Shen)*
- **Co-Investigator, approved 2021-B Canada-France-Hawaii Telescope proposal** *DEUS: Deep Euclid U band Survey*
- **Principal Investigator, approved SDSS-V Open Fiber Science Program** *Again With The Quasars (June 2020 - present)*
- Principal Investigator, approved 2021-A Canada-France-Hawaii Telescope proposal *Photometric Monitoring for a Multi-Object AGN Reverberation Mapping Campaign in SDSS-V*
- Co-Principal Investigator, (unsuccessful) Canada Foundation for Innovation 2020 Innovation Fund Proposal *Positioning Canada for Leadership in Next-Generation Spectroscopic Sky Surveys* (\$9,670,000), April 2018 - November 2020. As Science Co-PI, I led the writing of the scientific sections of the proposal, worked with Engineering Co-PI Dr. Colin Bradley (UVic) to liaison with interested industry partners to bring them into the proposal, and worked with 8 other team members at 7 other universities to establish the proposal goals, outline, and project management structure. Out of six categories, we received three ratings of ‘satisfies the criterion’ and three of ‘satisfies the criterion, but has a few minor weaknesses’. We plan to resubmit the proposal for the 2023 competition.
- Co-Principal Investigator, (unsuccessful) Canada Foundation for Innovation 2020 Innovation Fund Proposal *Canadian LSST Advanced Science Platform* (\$5,010,000), October 2018 - November 2020. As secondary Co-PI to primary Co-PI Dr. Renée Hlozek, I assisted in the development and writing of the proposal. Out of six categories, we received one rating of ‘satisfies and significantly exceeds the criterion’, four ratings of ‘satisfies the criterion’ and one of ‘satisfies the criterion, but has a few minor weaknesses’. We plan to resubmit the proposal for the 2023 competition.
- **Co-Investigator, Hubble Space Telescope Cycle 28 approved observing program** *Understanding the offset in the broad-line region size-luminosity relation with UV spectroscopy, May 2020 (PI: Dr. Yue Shen)*
- **Co-Investigator, Hubble Space Telescope Cycle 28 approved observing program** *AGN STORM 2: Mapping Gas Flows in AGNs by Reverberation, May 2020 (PI: Dr. Brad Peterson)*

- Scientific Organizing Committee Member, Canadian Astronomical Society annual meeting CASCA2020 at York University, September 2019 - March 2020, cancelled due to COVID-19 pandemic
- Invited Speaker, Astronomy Long Range Plan Town Hall, University of Toronto, Nov. 12, 2019
- Invited Speaker, *The Future of Astronomy Meeting*, Waterloo Centre for Astrophysics, Oct. 4, 2019
- Lead Author, Canadian Astronomy Long Range Plan 2020 White Paper, *The Maunakea Spectroscopic Explorer*
- Co-signer, Canadian Astronomy Long Range Plan 2020 White Paper, *Science, Technical and Strategic benefits of Canadian partnership with Subaru*, Balogh et al.
- Co-signer, Canadian Astronomy Long Range Plan 2020 White Paper, *Science with the Large Synoptic Survey Telescope*, Hlozek et al.
- Co-signer, Canadian Astronomy Long Range Plan 2020 White Paper, *Canadian Participation in the LSST*, Fraser et al.
- Co-signer, Canadian Astronomy Long Range Plan 2020 White Paper, *The next decade of optical wide field astronomy in Canada*, McConnachie et al.
- Co-signer, Canadian Astronomy Long Range Plan 2020 White Paper, *Revealing the Origin and Cosmic Evolution of Supermassive Black Holes*, Woods et al.
- Co-signer, Canadian Astronomy Long Range Plan 2020 White Paper, *CASTOR: A Flagship Canadian Space Telescope*, Cote et al.
- Co-Investigator, Hobby-Eberly telescope approved observing program *Checking for deceleration in a quasar outflow*, July 2019
- Principal Investigator, Gemini approved observing program *Checking for deceleration in a quasar outflow*, June 2019
- Ad Hoc Program Member, Faculty of Graduate Studies Appeals and Academic Honesty Committee, June 2019
- **York University representative to the Association of Canadian Universities for Research in Astronomy (ACURA) Institutional Council, Jun. 1, 2019 - present**
- Invited Speaker, 'Quasar Reverberation Mapping with Photometry and Spectroscopy', CFHT Users' Meeting, University of Montreal, May 19-22, 2019
- Principal Investigator, NSERC Engage Grant *Integrating an Analytical Business Intelligence Module into the Medical Confidence Machine Learning System* (\$24,977), September 2018 - February 2019. As PI, I headed a team of two computer programmers (Mr. Eytan Gornopolsky and Mr. Don Hutton) working as research associates. I supervised their creation and delivery of a prototype Jupyter notebook and associated subroutines (along with documentation). These programs create and use TensorFlow machine learning models for postdiction of existing patient

case wait times and for prediction of wait times for specific specialists for new cases (or fictitious test cases). The utility of the prototype software in reducing wait times through optimal specialist recommendation is promising, based on how well the software postdicted past wait times.

- Co-Investigator, NOAO approved observing survey program *DECam Early Imaging of AGN Reverberation Mapping Fields in SDSS-V*, January 2019 (PI: Dr. Yue Shen)
- Co-Investigator, Gemini approved observing survey program *Mapping the Accretion Disk and Broad Line Region of the Super-Eddington Active Galactic Nucleus Mrk 142*, December 2018 (PI: Ms. Viraja Khatu)
- Co-Investigator, Hubble Space Telescope Cycle 26 approved observing program *Ultraviolet Echoes of Quasar Accretion Disks*, November 2018 (PI: Ms. Yasaman Homayouni)
- External Referee, application for promotion for a professor at a Canadian university, Oct. 2018
- Invited Participant, *Wide Field Astronomy in Canada* meeting in Waterloo, ON, Oct. 2018
- **Member, Sloan Digital Sky Survey V (SDSS-V), June 2018 - present; featured in YFile Nov. 4, 2020**
- Accepted talk on ‘Canada and the Maunakea Spectroscopic Explorer’ at the Canadian Astronomical Society annual meeting, Victoria, BC, May 2018
- **Collaborator, Ultraviolet Near-Infrared Optical Northern Survey (UNIONS), Apr. 2018 - present**, and Canada-France Imaging Survey (CFIS), Feb. 2017 - Apr. 2018. UNIONS is a merger of CFIS and Pan-STARRS.
- Accepted talk on ‘Maunakea Spectroscopic Explorer: Key Science Drivers for a Wide Field Spectroscopic Survey Facility’ at the *SnowPAC Particle Astrophysics And Cosmology* meeting, Snowbird, UT, USA, March 2018
- Accepted talk on ‘The Maunakea Spectroscopic Explorer’ at the *Exploiting Extra-galactic Synergies between WFIRST and Future Facilities* workshop, Pasadena, CA, USA, February 2018
- Accepted talk on ‘MSE: Maunakea Spectroscopic Explorer’ at the *Decadal Survey Planning Community Workshop*, Tucson, AZ, USA, February 2018
- Chair, Maunakea Spectroscopic Explorer Management Group, December 2017 - December 2018
- Co-Investigator, XMM-Newton X-ray satellite approved observing program *Deciphering the Remarkable X-ray Spectrum of the Weak-Line Quasar SDSSJ1521+5202*, November 2017 (PI: Dr. Niel Brandt)
- Accepted talk on ‘MSE: Maunakea Spectroscopic Explorer’ at the *Cosmic Visions: Dark Energy* workshop, Berkeley, CA, November 2017
- Contractor for Essential Analysis and Design Services to Maunakea Spectroscopic Explorer Project Office, August - December 2017
- Member, Thirty-Meter Telescope International Science Development Team for Time Domain Science, August 2017 - August 2019

- Volunteer Visitor, National Research Council Herzberg Astronomy & Astrophysics, Victoria, BC, July 2017 - June 2018
- Collaborator with Dr. Nahum Arav & colleagues on U.S. NSF proposal “Where are BAL outflows located and how important are they to AGN Feedback?”, 2017-2021
- Co-Investigator, Hubble Space Telescope Cycle 25 approved observing program *Ultraviolet Echoes of Quasar Accretion Disks*, June 2017 (PI: Dr. Jonathan Trump)
- Accepted talk on “Updates on Emergent and Redshifted BAL Quasars” at the *Active Galactic Nuclei Winds on the Georgia Coast* meeting, Georgia, USA, June 2017
- Invited Participant, *AGN Driven Winds* conference at Technion, Haifa, Israel, May 2017
- Participant, *Disks, Dynamos, and Data: Confronting MHD Accretion Theory with Observations* conference at Kavli Institute for Theoretical Physics, Santa Barbara, California, Feb. 2017
- Principal Investigator, approved Canada-France-Hawaii Telescope proposal *A Transformative Multi-Object AGN Reverberation Mapping Campaign: Continued Photometric Monitoring in 2017A*
- **Maunakea Spectroscopic Explorer Management Group Member, November 2016 - present**
- Collaborator, After SDSS-IV white paper proposal ‘New Dimensions in Black Hole Accretion from Repeat Spectroscopy of Quasars’
- Co-signer, “The Astropy Problem” white paper, (arXiv:1610.03159)
- Invited Participant, *Astronomy 8* conference at the University of Oxford, UK, June 2016
- **Member, Canadian Large Synoptic Survey Telescope Consortium, April 2016 - present**
- Local Organizing Committee Member, 2016 Great Lakes Quasar Symposium, August 2015 - May 2016
- Speaker, Maunakea Spectroscopic Explorer Collaboration Meeting, Madrid, April 27-29, 2016
- Principal Investigator, approved Canada-France-Hawaii Telescope proposal *A Transformative Multi-Object AGN Reverberation Mapping Campaign: Continued Photometric Monitoring in 2016A*
- Co-signer, After SDSS-IV white paper ‘All-Sky Multi-Epoch Spectroscopy of Quasars’
- Co-Investigator, Chandra X-ray Observatory approved observing programs *Constraining X-ray Absorption in Emergent BAL Quasars* and *Bridging the Gap Between Weak-Line and Typical Quasars*, 2015-2016
- Principal Investigator, approved Canada-France-Hawaii Telescope proposal *A Transformative Multi-Object AGN Reverberation Mapping Campaign: Continued Photometric Monitoring in 2015A*
- **Maunakea Spectroscopic Explorer Science Team member, August 2014 - present**

- **External Collaborator in the Sloan Digital Sky Survey IV Collaboration for research on Broad Absorption Line Quasars, July 2014 - June 2020**
- Co-Investigator, Chandra X-ray Observatory approved observing programs *The Nature of Quasars with Redshifted Broad Absorption Lines* and *Shielding Gas Variations in Transforming Broad Absorption Line Quasars*, 2014-2015
- Maunakea Spectroscopic Explorer Advisory Group Member, June 2014 - October 2016
- **External Collaborator in the Sloan Digital Sky Survey IV Collaboration for research on Quasar Reverberation Mapping, Feb. 2014 - June 2020**
- York University representative to the Association of Canadian Universities for Research in Astronomy (ACURA) Institutional Council, Jan. 1, 2014 - Dec. 31, 2016

### **Scientific Papers, Proposals, and Funding Applications Refereed**

- One proposal for the Gemini Telescopes, October 2021
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- One proposal for the Canada-France-Hawaii Telescope, October 2020
- One proposal for the Gemini International Telescopes, May 2020
- Paper for the Monthly Notices of the Royal Astronomical Society, October 2019 - December 2019
- Paper for Nature Astronomy, July 2018 - August 2018
- Paper for The Astrophysical Journal, January 2018 - April 2018
- Paper for The Astrophysical Journal, August 2017 - September 2017
- One proposal for the Gemini International Telescopes, April 2017
- One proposal for the Gemini International Telescopes, November 2016

### **Invited Colloquia and Seminars (32 as of November 2019)**

- Queen's University, Physics & Astronomy Dept. Seminar, November 2019: 'Quasar Reverberation Mapping and the Maunakea Spectroscopic Explorer'
- York University, Physics & Astronomy Dept. Colloquium, October 2019: 'How to Learn About Quasars From Quite A Long Way Away'
- Virginia Polytechnic University, Physics & Astronomy Dept. Seminar, April 2019: 'Quasar Reverberation Mapping and the Maunakea Spectroscopic Explorer'
- University of British Columbia, Dept. of Physics & Astronomy Cosmo-Pizza Seminar, March 2018: 'Quasar Reverberation Mapping and the Maunakea Spectroscopic Explorer'

- University of Victoria, Dept. of Physics & Astronomy Seminar, January 2018: ‘Quasar Outflows: the Fast and the Furious’
- Western University, Dept. of Physics & Astronomy Colloquium, January 2016: ‘Quasar Outflows: the Fast and the Furious’

### **Memberships in Professional and Related Societies**

- Canadian Association of Physicists (2014-present)
- International Astronomical Union (2003-present)
- Canadian Astronomical Society (1998-present)
- American Astronomical Society (1991-present)

### **Graduate Supervisions (3 PhD completed; 5 MSc completed)**

- Erik Weiss, York University Astronomy Thesis Master’s program *Mathematical Studies of Quasar Outflows and Spectra* (May 2021 - present).
- Lucas Seaton, York University Astronomy Thesis Master’s program *Star-Disk Collisions in Quasars* (September 2020 - present).
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- Courtney Mulholland, York University Astronomy Project Master’s program *Quasar Wind Deceleration* (September 2018 - May 2020). Currently Data Scientist at RBC Wealth Management.
- Nabeel Ahmed, York University Astronomy Project Master’s program *Redshifted Broad Absorption-Line Quasars: Variability, Infall, and Rotating Outflows* (September 2015 - May 2017). Currently Anti Money Laundering QA Analyst at CIBC in Toronto, ON.
- Jesse Rogerson, York University Astronomy PhD program *Monitoring Broad Absorption-Line Quasar Variability* (January 2011-May 2016) and York University Astronomy Thesis Master’s program, *Investigating Mg II Absorption in Quasar Pair Sight Lines* (September 2007-December 2010). Currently an Assistant Professor in the Division of Natural Science, York University.

### **Graduate Supervisory and Examining Committee Memberships**

- York University Department of Physics and Astronomy internal PhD supervisory committee member for Visal Sok (program: Physics and Astronomy, supervisor: Dr. Adam Muzzin), **April 2022 - present**
- York University Department of Physics and Astronomy internal MSc supervisory committee member for Sunna Withers (program: Physics and Astronomy, supervisor: Dr. Adam Muzzin), **April 2022 - present**



- York University Department of Physics and Astronomy internal MSc supervisory committee member for West Brown (program: Physics and Astronomy, supervisor: Dr. Adam Muzzin), **April 2021 - present**
- York University Department of Physics and Astronomy internal MSc supervisory committee member for Justin Kerr (program: Physics and Astronomy, supervisor: Dr. John Moores), **April 2021 - present**
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- York University Department of Physics and Astronomy internal PhD supervisory committee member for Richard Bloch (program: Physics and Astronomy, supervisor: Dr. Matthew Johnson), **April 2019 - present**
- York University Department of Physics and Astronomy internal MSc supervisory committee member for Chris Rampersad (program: Physics and Astronomy, supervisor: Dr. Adam Muzzin), April 2019
- York University Faculty of Graduate Studies Master's examining committee member for Ms. Elisabeth Smith (program: Earth and Space Sciences and Engineering, supervisor: Dr. John Moores), September 2018
- University of Waterloo Faculty of Science PhD examining committee external examiner for Mr. Mansour Karami (program: Astronomy, supervisors: Dr. Niayesh Afshordi and Dr. Avery Broderick), September 2018
- York University Faculty of Graduate Studies Master's examining committee member for Mr. Jacob Kloos (program: Earth and Space Sciences and Engineering, supervisor: Dr. John Moores), September 2016
- York University Department of Physics and Astronomy internal PhD supervisory committee member for Mr. George Conidis (program: Physics and Astronomy, supervisor: Dr. Marshall McCall), 2014-2016

### **Postdoctoral Fellow Research Mentoring**

- March 2015-May 2015: supervised Dr. Alireza Rafiee in his role as lead author on a peer-reviewed paper investigating three 'disappearing FeLoBAL' quasars whose broad absorption has greatly decreased in the recent past.
- January 2012-July 2015: supervised York postdoctoral researcher Dr. Paola Rodríguez Hidalgo on numerous projects involving broad absorption line quasars. During her work with me, Dr. Rodríguez Hidalgo presented her work at several targeted scientific meetings, including an Aspen Center for Physics workshop, and at one meeting of the American Astronomical Society. Dr. Rodríguez Hidalgo is currently a professor at Humboldt State University in California.

### **Graduate Student Research Mentoring**

- **May 2021-present:** supervising York Master's student Erik Weiss on projects to study deceleration of BAL quasar outflows as they sweep up gas in the surrounding galaxy, and to derive the fundamental emission components of quasars.
- **September 2020-present:** supervising York Master's student Lucas Seaton on a project to study possible observable effects of collisions of stars with quasar accretion disks.
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- September 2018-May 2020: supervised York Master's student Courtney Mulholland on a project to study deceleration of BAL quasar outflows as they sweep up gas in the surrounding galaxy.
- September 2015-May 2017: supervised York Master's student Nabeel Ahmed on projects to study and model the absorption-line and variability properties of redshifted BAL quasars and the emission-line and variability properties of weak-lined quasars.
- January 2011-May 2016: supervised York graduate student Jesse Rogerson on a PhD project to study BAL quasar variability. Mr. Rogerson has presented on aspects of this work with posters at two targeted scientific meetings and one meeting of the Canadian Astronomical Society, and with a talk at the National Optical Astronomy Observatory's Friday Scientific Lunch Talk series in Tucson, Arizona.
- January 2011-May 2016: supervised York graduate student Jesse Rogerson on a PhD project to study BAL quasar variability. Mr. Rogerson has presented on aspects of this work with posters at two targeted scientific meetings and one meeting of the Canadian Astronomical Society, and with a talk at the National Optical Astronomy Observatory's Friday Scientific Lunch Talk series in Tucson, Arizona.

### **Undergraduate Student Research Mentoring**

- June 2021-August 2021: supervised York undergraduate Devon Hass (as a York Science recipient) on a project to create HTML webpages demonstrating the time variability of quasars studied in SDSS-V in Python. Devon wrote the code and I guided and supervised the project. The created HTML files have been distributed to the SDSS-V collaboration and several interesting examples of variability have already been identified.
- May 2020-August 2020: supervised recent York graduate Dyuman Bhattacharya (as an NSERC USRA recipient) on a project to derive the fundamental emission components of quasars, including deriving matrix derivative updates accounting for multiplicative wavelength-dependent attenuation.
- May 2019-August 2019, May 2020-Oct 2020: supervised York undergraduate Ghassan Sarrouh (first as a Dean's Undergraduate Research Award recipient) on a project to derive the fundamental emission components of quasars using advanced statistical techniques.
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- May 2019-July 2019: supervised York undergraduate Romina Bahrami on a 12-week project to derive the fundamental emission components of quasars using advanced statistical techniques, specifically Complex Nonnegative Matrix Factorization.

- November 2016-April 2017: supervised York undergraduate Ghassan Sarrouh on visualization of the offset of Earth's oceanic tidal bulge from the Earth-Moon line and on calculation of the radial temperature structure of accretion disks.

### High School Student Research Mentoring

#### Course Directorships

- **Physics 2030 'Computational Methods for Physicists and Engineers'**: W2021, W2020, W2019
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- Natural Sciences 1570 'Exploring the Solar System': F2020, W2019
- Physics 1070 'Fundamentals of Astronomy': W2017, F2015, F2014, F2007, W2005
- Physics 4070/5090 'Stars and Nebulae': W2016, W2014, W2012, W2010, W2008, W2006
- Physics 4270/5390 'Astronomical Techniques': Y2008-09, Y2006-07
- Physics 5290 'Extragalactic Astronomy': F2012, F2018, F2021
- Natural Sciences 1740 'Astronomy': F2016, W2015, Y2013-14, Y2012-13, Y2011-12, Y2009-10, Y2008-09, W2008, Y2006-07, Y2005-06, F2004

#### Graduate Teaching

- **Fall 2021: York University Physics 5290 'Extragalactic Astronomy'**
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- Fall 2018: York University Physics 5290 'Extragalactic Astronomy'
- Winter 2016: York University Physics 4070/5090 'Stars and Nebulae'
- Winter 2014: York University Physics 4070/5090 'Stars and Nebulae'

#### Undergraduate Teaching

- **Winter 2021: Physics 2030 'Computational Methods for Physicists and Engineers' (one-term course required for most majors in the Department)**
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- Winter 2020: Physics 2030 'Computational Methods for Physicists and Engineers' (one-term course required for most majors in the Department), including creation of a few new in-class conceptual programming exercises and homework and exam problems

- Fall 2020: Natural Sciences 1570 'Exploring the Solar System' (one-term introductory course for students outside the Faculty of Science), including clicker quizzes and in-class activities
- Winter 2019: Physics 2030 'Computational Methods for Physicists and Engineers' (one-term course required for most majors in the Department), including creation of in-class conceptual programming exercises and homework and exam problems
- Winter 2019: Natural Sciences 1570 'Exploring the Solar System' (one-term introductory course for students outside the Faculty of Science), including clicker quizzes and in-class activities
- Winter 2017: Physics 1070 'Fundamentals of Astronomy' (one-term introductory course open to any qualifying student; required for astronomy stream physics majors), including introduction of online telescope network usage to obtain images for interpretation by students
- Fall 2016: Natural Sciences 1740 'Astronomy' (fall term of two-term introductory course for students outside the Faculty of Science), including re-introduction of clicker quizzes and design and testing of a few new in-class activities

### **Public Outreach, Education, and Media Coverage**

- Public Talk to University of Toronto Astronomy and Space Exploration club: 'Quasars: Black Holes You Can "See"', October 24, 2018
- Public Talk for Science Literacy Week at York University 'Our Weird Universe!', September 19, 2018
- Public Talk to RASC Victoria Centre 'Quasars: Black Holes You Can "See"', January 10, 2018
- Public Talk 'Quasar, Quasar, Burning Bright' (Chronicles of a Peculiar Universe #1) at Toronto Public Library Coxwell Branch, October 11, 2017
- Public Talk on 'Gas Falling into Black Holes: A Surprising Discovery' at a Dominion Astrophysical Observatory Summer Star Party evening, August 26, 2017
- Performer at Science Slam for Science Rendezvous After Dark: Hard-Boiled Astronomy, May 13, 2017
- Public Talk to York University Astronomy Club, 'In Search Of... Planet Nine', Mar. 22, 2017
- Actor, Dark Energy Infomercial parody at .Astronomy 2016 conference
- Nucleosynthesis - The Musical! public talk to York University Astronomy Club, Mar. 23, 2016
- Press release on ultra-fast winds near supermassive black holes, reporting the discovery of record high-speed UV absorption in collaboration with my grad student Jesse Rogerson, March 21, 2016

### **Academic Activities and Service**

- **York University Faculty of Science Committee on Examinations and Academic Standards member, Winter 2022**

- **Member, York University Department of Physics & Astronomy Adjudicating Committee for the tenure and promotion of Prof. J. Zylberberg, October 2021 - present**
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- Chair, York University Department of Physics & Astronomy tenure and promotion pre-candidacy to candidacy adjudicating committee for Prof. E. Hyde, June - Sept. 2021
- **Chair, York University Department of Physics & Astronomy File Preparation committee for the tenure and promotion of Prof. J. Zylberberg, June 2021 - Oct. 2021**
- Trainee, York University / Livingworks Start online training module to recognize and react appropriately to thoughts of suicide in others, February 7, 2021
- **Member, York University Department of Physics & Astronomy File Preparation Committee for the promotion of Prof. C. Storry, January 2021 - present**
- Member, York University Department of Physics & Astronomy Adjudicating Committee for the tenure and promotion of Prof. O. Mermut, November 2020 - July 2021
- Member, York University Department of Physics & Astronomy Adjudicating Committee for the tenure and promotion of Prof. A. Muzzin, October 2020 - July 2021
- **Member of the CRESS Executive (Centre for Research in Earth and Space Science), York University, September 2020 - present**
- Member, York University Faculty of Science Research-Stream Black Faculty Search Committee, August 2020 - May 2021
- Trainee, York University Unconscious Bias Affirmative Action Workshop, April 27, 2020
- Member, York University Faculty of Science Major Awards Advisory Committee, April 2020
- Teaching referee for the promotion to Full Professor of Prof. M. Armour, February 2020 - May 2020
- Teaching referee for the tenure and promotion of Prof. A. Muzzin, January 2020 - May 2020
- Chair, York University Department of Physics & Astronomy File Preparation committee for the tenure and promotion of Prof. A. Muzzin, January 2019 - July 2021
- Member, York University Faculty of Science Curriculum committee, Summer 2019 - Summer 2020
- Member, York University Department of Physics & Astronomy Curriculum committee, Summer 2019 - Summer 2020
- Ad Hoc Program Member, Faculty of Graduate Studies Appeals and Academic Honesty Committee, June 2019
- Member, York University Division of Natural Science Advisory Committee, April 2019 - June 2020

- Dean's Representative, York University Physics & Astronomy / Fermilab Joint Research-Stream Faculty Search Committee, December 2018 - May 2019
- Affirmative Action Representative, York University Physics & Astronomy Alternate-Stream Faculty Search Committee, August 2018 - December 2018 (recused due to conflict of interest)
- Chair, York University Observational Astrophysics Faculty Search Committee, August 2015 - April 2016
- Undergraduate Program Director, Physics & Astronomy Department, July 1, 2014 - June 30, 2017
- Faculty of Science Committee on Tenure and Promotions Alternate Member, Fall 2013 - Winter 2016

### **Research Skills**

- Very experienced with longslit, multislit, and multifiber optical spectroscopy.
- Experienced with deep and wide-field optical and infrared imaging and reductions
- Experienced with optical/IR observing and 1-2m class telescope operation.
- Experienced with adaptive-optics infrared imaging and reductions.
- Experienced with acquisition and reduction of polarimetric data.
- Experienced with analysis of X-ray imaging data.
- Experienced with acquisition and reduction of SCUBA sub-millimeter data.
- Very experienced with IRAF as both software and programming language.
- Also experienced with SM, UNIX, L<sup>A</sup>T<sub>E</sub>X, MATLAB, SQL, Python, HTML, IDL, Perl, and FORTRAN.

## Publications (Lifetime Summary)

ORCID: 0000-0002-1763-5825

Books: 3 (partial authorship/editorship)  
 Chapters in books: 0  
 Papers in refereed journals: 239 (First author: 28)  
 Papers in refereed conference proceedings: 52 (First author: 10)  
 Technical reports: 0  
 Abstracts & other unrefereed contributions: 105 (First author: 21)  
 Other: 1  
 Independent Papers by Research Group Members: 4

## Publications (Details, Current and Past 6 Calendar Years)

### Books

- “Solar System Activities Manual,” **Patrick Hall**, 2018 (Kendall Hunt: Des Moines)  
*Includes three new in-class activities for introductory astronomy courses, plus material from my 2012 workbook.*
- “Extragalactic Astronomy Activities Manual,” **Patrick Hall**, 2017 (Kendall Hunt: Des Moines)  
*Includes about half the in-class activities for introductory astronomy courses from my 2012 workbook.*

### Papers in Refereed Journals

(Key: AAS - American Astronomical Society; AJ - The Astronomical Journal; ApJ - The Astrophysical Journal; ApJL - The Astrophysical Journal Letters; ApJS - The Astrophysical Journal Supplement Series; A&A - Astronomy & Astrophysics; A&AL - Astronomy & Astrophysics Letters; BAAS - Bulletin of the American Astronomical Society; JAAVSO - Journal of the American Association of Variable Star Observers; MNRAS - Monthly Notices of the Royal Astronomical Society; PASJ - Proceedings of the Astronomical Society of Japan; PASP - Proceedings of the Astronomical Society of the Pacific)

### Submitted

(Key to paper title fonts: **First Author**; *Heavy Involvement*; Some Contribution)  
 (Key to author fonts: Highly Qualified Personnel collaborators at York are underlined)

- “AGN STORM 2: II. Ultraviolet Observations of Mrk 817 with the Cosmic Origins Spectrograph on the Hubble Space Telescope,” Homayouni, et al. 2022, ApJ, submitted
- “Correlated X-ray and UV absorption within the accretion disk wind of the active galactic nucleus PG 1126–041,” Giustini et al. 2022, Astronomy & Astrophysics, submitted
- “VLT/UVES Observation of the SDSS J2357–0048 Outflow,” Byun, Arav & Hall 2022, MNRAS, submitted

### In Press

### Published

- “Sensitive Chandra coverage of a representative sample of weak-line quasars: revealing the full range of X-ray properties,” Ni, et al. 2022, MNRAS, 511, 5251 (arXiv:2202.05279)  
*I contributed to the interpretation and presentation of results.*
- “The Farthest Quasar Mini-BAL Outflow from its Central Source: VLT/UVES Observation of SDSS J0242+0049,” Byun, Arav & Hall 2022, ApJ, 927, 176 (arXiv:2202.08865)  
*I contributed to the analysis approach and to the interpretation, discussion and presentation of results.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: UV-Optical Accretion Disk Measurements with Hubble Space Telescope,” Homayouni, et al. 2022, ApJ, 926, 225 (arXiv:2105.02884)  
*I provided feedback on the interpretation and presentation of results.*
- “Obscured active galactic nuclei and the need for optical to near-infrared, massively multiplexed, spectroscopic facilities,” Petric, et al. 2022, Astronomische Nachrichten, 343, e210053  
*I provided comments and feedback during the writing of the article.*
- “AGN STORM 2: I. First results: A Change in the Weather of Mrk 817,” Kara, et al. 2021, ApJ, 922, 151 (arXiv:2105.05840)  
*I provided feedback on the presentation of results.*
- “Space Telescope and Optical Reverberation Mapping Project. IX. Velocity-Delay Maps for Broad Emission Lines in NGC 5548,” Horne, et al. 2021, ApJ, 907, 76 (arXiv:2003.01448)  
*I provided feedback on the presentation of results.*
- “Space Telescope and Optical Reverberation Mapping Project. XII. Broad-Line Region Modeling of NGC 5548,” Williams, et al. 2020, ApJ, 902, 74 (arXiv:2010.00594)  
*I am a member of the AGN STORM project.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Estimating Masses of Black Holes in Quasars with Single-Epoch Spectroscopy,” Dalla Bontà, et al. 2020, ApJ, 903:112 (28pp) (arXiv:2007.02963)  
*I provided feedback on the presentation of results.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: How Broad Emission Line Widths Change When Luminosity Changes,” Wang, et al. 2020, ApJ, 903:51 (30pp) (arXiv:2006.06178)  
*I am a member of the SDSS-RM collaboration.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Mg II Lag Results from Four Years of Monitoring,” Homayouni, et al. 2020, ApJ, 901:55 (14pp) (arXiv:2005.03663)  
*I provided feedback on the presentation of results.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Photometric  $g$  and  $i$  Light Curves,” Kinemuchi, **Hall**, et al. 2020, ApJS, 250:10 (14pp) (arXiv:2007.05160)  
*I was the PI of the CFHT proposal which provided much of the data in this paper, was involved in the analysis, and was heavily involved in the writeup.*



- “Survey of Extremely-High-Velocity Outflows in Quasars,” Paola Rodríguez Hidalgo, Abdul Moiz Khatri, **Patrick B. Hall**, Sean Haas, Carla Quintero, Viraja Khatu, Griern Kowash, & Norm Murray 2020, ApJ, 896, 151 (arXiv:2006.05633)  
*I was heavily involved in all aspects of this research.*
- “An Extreme X-ray Variability Event of a Weak-Line Quasar,” Ni, Brandt, Yi, Luo, Timlin, **Hall**, Liu, Plotkin, Shemmer, Vito, & Wu 2020, ApJL, 889, L37 (arXiv:2001.08216)  
*I contributed to the interpretation of the results reported in this paper.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Initial C IV Lag Results from Four Years of Data,” Grier, Shen, Horne, Brandt, Trump, **Hall**, et al. 2019, ApJ, 887:1 (38pp) (arXiv:1904.03199)  
*I provided feedback and clarification on the presentation of results.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Accretion and Broad Emission Line Physics from a Hypervariable Quasar,” Dexter, Xin, Shen, Grier, Liu, Gezari, McGreer, Brandt, **Hall**, Horne, Simm, Merloni, Green, Vivek, Trump, Homayouni, Peterson, Schneider, Kinemuchi, Pan, & Bizyaev 2019, ApJ, 885:44 (11pp) (arXiv:1906.10138)  
*I provided feedback and clarification on the interpretation of results.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Comparison of Lag Measurement Methods with Simulated Observations,” Li, Shen, Brandt, Grier, **Hall**, Ho, Homayouni, Horne, Schneider, Trump, Starkey et al. 2019, ApJ, 884:119 (21pp) (arXiv:1909.03092)  
*I provided feedback on the presentation of results.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Improving Lag Detection with an Extended Multi-Year Baseline,” Shen, Grier, Horne, Brandt, Trump, **Hall** et al. 2019, ApJL, 883, L14 (arXiv:1908.00027)  
*I provided feedback and clarification on the presentation and interpretation of results.*
- “Space Telescope and Optical Reverberation Mapping Project. VIII. Time Variability of Emission and Absorption in NGC 5548 Based on Modeling the Ultraviolet Spectrum,” Kriss et al. 2019, ApJ, 881, 153 (arXiv:1907.03874)  
*I provided feedback and clarification on the presentation of results.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Accretion-Disk Sizes From Continuum Lags,” Homayouni, Trump, Grier, Shen, Brandt, Starkey, **Hall**, Horne, Kinemuchi, Li, McGreer, Sun, Ho, & Schneider 2019, ApJ, 880, 126 (arXiv:1806.08360)  
*I contributed to the analysis, understanding, and presentation of these results.*
- “The Extremely Luminous Quasar Survey in the Pan-STARRS 1 Footprint (PS-ELQS),” Schindler, Fan, Huang, Yue, Yang, **Hall**, Wenzl, Hughes, Litke, & Rees 2019, ApJS, 243, 5 (arXiv:1905.04069)  
*I provided human-expert identification of BAL quasars and their redshifts.*
- “Variability Of Low-Ionization Broad Absorption Line Quasars Based On Multi-Epoch Spectra From The Sloan Digital Sky Survey,” Yi, Brandt, **Hall**, Vivek, Grier, Filiz Ak, Schneider, & McGraw 2019, ApJS, 242, 28 (arXiv:1905.01573)  
*I provided extensive feedback to modeling approaches and interpretation of results in this paper.*

- “The Sloan Digital Sky Survey Reverberation Mapping Project: Sample Characterization,” Shen, **Hall**, Horne, Zhu, McGreer, Simm, Trump, Kinemuchi, Brandt, Green, Grier, Guo, Ho, Homayouni, Jiang, Li, Morganson, Petitjean, Richards, Schneider, Starkey, Wang, Chambers, Kaiser, Kudritzki, Magnier, & Waters 2019, ApJS, 241, 34 (16pp) (arXiv:1810.01447)  
*I am a founding member of this project and led the CFHT imaging observations for it.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Systematic Investigations of Short-Timescale CIV Broad Absorption Line Variability,” Hemler, Grier, Brandt, **Hall**, Horne, Shen, Trump, Schneider, Vivek, Bizyaev, Oravetz, Oravetz, & Pan 2019, ApJ, 872, 21 (21pp) (arXiv:1811.00010)  
*I contributed greatly to the analysis of these spectra and the interpretation of the observed variability.*
- “X-ray and multi-epoch optical/UV investigations of BAL to non-BAL quasar transformations,” Sameer, Brandt, Anderson, Filiz Ak, Grier, **Hall**, Vivek, Ahmed, Luo, Myers, Rodríguez Hidalgo, Ruan, & Schneider 2019, MNRAS, 482, 1121 (14pp) (arXiv:1810.03625)  
*I analysed optical spectra for this project and contributed to the interpretation of the results.*
- “Connecting the X-ray properties of weak-line and typical quasars: testing for a geometrically thick accretion disk,” Ni, Brandt, Luo, **Hall**, Shen, Anderson, Plotkin, Richards, Schneider, Shemmer & Wu 2018, MNRAS, 480, 5184 (19pp) (arXiv:1807.08757)  
*I analysed optical spectra for this project and contributed to the interpretation of the results.*
- “Redshifted broad absorption line quasars found via machine-learned spectral similarity,” Reis, Poznanski, & **Hall** 2018, MNRAS, 480, 3889 (9pp) (arXiv:1805.09829)  
*I provided human-expert identification of redshifted BAL quasars and interlopers to refine the accuracy of the machine learning algorithm used herein.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Quasar Host Galaxies at  $z < 0.8$  from Image Decomposition,” Yue, Jiang, Shen, **Hall**, Yu, Schneider, Ho, Horne, Petitjean, & Trump 2018, ApJ, 863, 21 (17pp) (arXiv:1806.09083)  
*I was PI of the CFHT proposal which obtained the data used in this project.*
- “Emergence and Variability of Broad Absorption Line Quasar Outflows,” Rogerson, **Hall**, Ahmed, Rodríguez Hidalgo, Brandt, & Filiz Ak 2018, ApJ, 862, 1 (22p) (arXiv:1807.07594)  
*I guided and supervised this work, which was a part of Dr. Rogerson’s PhD thesis at York.*
- “The Sloan Digital Sky Survey Quasar Catalog: fourteenth data release,” Pâris et al. 2018 (40 authors), A&A, 613, A51 (17pp) (arXiv:1712.05029)  
*I contributed to the identification of some quasars in this publication.*
- “The Fourteenth Data Release Of The Sloan Digital Sky Survey: First Spectroscopic Data From The Extended Baryon Oscillation Spectroscopic Survey And From The Second Phase Of The Apache Point Observatory Galactic Evolution Experiment,” Abolfathi et al. 2018, ApJS, 235:42 (19pp) (arXiv:1707.09322)  
*I am an External Collaborator in the SDSS-IV collaboration.*
- “Spectroscopic characterization of galaxy clusters in RCS-1: spectroscopic confirmation, redshift accuracy, and dynamical mass-richness relation,” Gilbank et al. 2018, MNRAS, 476, 1991-2012  
*I contributed to obtaining the observations for this paper.*

- “**Non-Blackbody Disks Can Help Explain Inferred AGN Accretion Disk Sizes**,” **Hall, Sarrouh & Horne** 2018, ApJ, 854:93 (10pp) (arXiv:1705.05467)
- “The Time-Domain Spectroscopic Survey: Target Selection for Repeat Spectroscopy,” MacLeod et al. 2017, AJ, 155:6 (17pp) (arXiv:1706.04240)  
*I contributed heavily to the target selection for a subset of objects in this paper.*
- “The Sloan Digital Sky Survey reverberation mapping project: H-alpha and H-beta reverberation measurements from first-year spectroscopy and photometry,” Grier et al. 2017, ApJ, 851:21 (22pp) [Erratum: ApJ, 868, 76 (2018)] (arXiv:1711.03114)  
*I contributed to obtaining and verifying data used in this paper.*
- “Optical linear polarization measurements of quasars obtained with the 3.6 m telescope at the La Silla Observatory,” Hutsemékers, **Hall** & Sluse 2017, A&A, 606, A101 (4pp) (arXiv:1709.01309)  
*I contributed to gathering the data presented in this paper.*
- “Space Telescope and Optical Reverberation Mapping Project. VII. Understanding the UV anomaly in NGC 5548 with X-Ray Spectroscopy,” Mathur et al. 2017, ApJ, 846:55 (9pp) (arXiv:1704.06345)  
*I contributed to the discussion of the results of this paper.*
- “Broad absorption line disappearance and emergence using multiple-epoch spectroscopy from the Sloan Digital Sky Survey,” McGraw, Brandt, Grier, Filiz Ak, **Hall**, et al. 2017, MNRAS, 469, 3163-3184 (arXiv:1705.03019)  
*I contributed to the discussion of the results of this paper.*
- “X-ray Insights into the Nature of Quasars with Redshifted Broad Absorption Lines,” Zhang, Brandt, Ahmed, **Hall**, et al. 2017, ApJ, 839, 101 (arXiv:1703.08180)  
*I contributed to the interpretation and discussion of the results of this paper.*
- “Space Telescope and Optical Reverberation Mapping Project. V. Optical Spectroscopic Campaign and Emission-Line Analysis for NGC 5548,” Pei et al. 2017, ApJ, 837, 131 (arXiv:1702.01177)  
*I am a member of the AGN STORM project.*
- “Magnetohydrodynamic Disc Winds and Line Width Distributions II,” Chajet & **Hall** 2017, MNRAS, 465, 1741 (arXiv:1611.01067)  
*I guided and supervised this work, which was a part of Dr. Chajet’s PhD thesis at York.*
- “Space Telescope and Optical Reverberation Mapping Project. VI. Reverberating Disk Models for NGC 5548,” Starkey et al. 2017, ApJ, 836, 65 (arXiv:1611.06051)  
*I contributed some clarification and discussion to the text of the paper.*
- “The Sloan Digital Sky Survey Quasar Catalog: twelfth data release,” Pâris et al. 2017 (46 authors), A&A, 597, A79 (25pp) (arXiv:1608.06483)  
*I contributed to the identification of some quasars in this publication.*
- “C IV Broad Absorption Line Acceleration in Sloan Digital Sky Survey Quasars,” Grier, Brandt, **Hall**, Trump, Filiz Ak, Anderson, Green, Schneider, Sun, Vivek, Beatty, Brownstein & Roman-Lopes 2016, ApJ, 824, 130 (22pp) (arXiv:1604.07410)  
*I contributed derivations, text, analysis, and interpretation to this publication.*

- “Space Telescope and Optical Reverberation Mapping Project. IV. Anomalous Behavior of the Broad Ultraviolet Emission Lines in NGC 5548,” Goad et al. 2016, ApJ, 824, 11 (10pp)  
(arXiv:1603.08741)  
*I helped revise the proposal that yielded the Hubble Space Telescope data studied herein.*
- “Vanishing Absorption and Blueshifted Emission in FeLoBAL Quasars,” Rafiee, Pirkola, **Hall**, Galati, Rogerson, & Ameri 2016, MNRAS, 459, 2472-2485 (arXiv:1604.06977)  
*I contributed figures, text, analysis, and interpretation to this publication.*
- “Space Telescope and Optical Reverberation Mapping Project. III. Optical Continuum Emission and Broad-Band Time Delays in NGC 5548,” Fausnaugh et al. 2016, ApJ, 821, 56 (25pp)  
(arXiv:1510.05648)  
*I helped revise the proposal that yielded the Hubble Space Telescope data studied herein.*
- “Multi-Epoch Observations of Extremely High-Velocity Emergent Broad Absorption,” Rogerson, **Hall**, Rodríguez Hidalgo, Pirkola, Brandt & Filiz Ak 2016, MNRAS 457 (1): 405-420  
(arXiv:1509.02842)  
*I contributed to the analysis and interpretation of the results in this publication.*
- “The Sloan Digital Sky Survey Reverberation Mapping Project: First Broad-Line  $H\beta$  and Mg II Lags at  $z \geq 0.3$  from Six-Month Spectroscopy,” Shen et al. 2016, ApJ, 818, 30 (17pp)  
(arXiv:1510.02802)  
*I contributed comments on the paper text and content.*

### Conference Proceedings

- “Searching for a Connection Between Radio Emission and UV/optical Absorption in Quasars,” Haas, S. Khatri, A. M., Quintero, C., Hall, P. 2017, in “Proceedings of the National Conference on Undergraduate Research 2016,” Faculty Advisor: Dr. Paola Rodríguez Hidalgo

### Abstracts and Other Unrefereed Contributions

- “Quasar Outflow Bubbles: Searching for Deceleration”, Weiss & **Hall** 2022, poster at the Canadian Astronomical Society annual meeting 2022
- “The Sloan Digital Sky Survey Reverberation Mapping Project: Initial Lag Results from Seven Years of Data”, Carvajal, Grier, Shen, Horne, Homayouni, **Hall** & Brandt 2022, AAS meeting 240, #230.05
- “Stars Vs Quasar Disks”, Seaton & **Hall** 2021, poster at the Sloan Digital Sky Survey Collaboration Meeting, August 2021
- “**Shocking Quasar Outflows 2: Still Coasting After All These Years**”, **Hall** & Mulholland 2020, poster at the Canadian Astronomical Society annual meeting 2020
- “AGN and Supermassive Black Holes with MSE”, Petric, et al. 2020, AAS meeting 235, #339.06

- “SDSS Reverberation Mapping Project - Variability Identification”, Kinemuchi, **Hall**, et al. 2020, AAS meeting 235, #305.32
- “Shocking Quasar Outflows”, Mulholland & **Hall** 2019, poster at the Canadian Astronomical Society annual meeting 2019
- Astro2020 Science White Paper “High Redshift Obscured Quasars and the Need for Optical to NIR, Massively Multiplexed, Spectroscopic Facilities,” Petric et al. 2019 (18 authors), (arXiv:1905.10489)
- “The Detailed Science Case for the Maunakea Spectroscopic Explorer, 2019 edition” The MSE Science Team: Babusiaux et al. 2019 (263 authors), (arXiv:1904.04907)
- Astro2020 Science White Paper “Mapping the Inner Structure of Quasars with Time-Domain Spectroscopy,” Shen, et al. 2019 (43 authors), (arXiv:1903.04533)
- “Investigations of transforming BAL quasars,” Sameer, Brandt, **Hall**, Anderson, Mariappan, Filiz Ak, Grier, Ahmed, Luo, Myers, Rodríguez Hidalgo, Ruan, & Schneider 2019, AAS meeting 233, #242.07
- “Extremely High Velocity Outflows in Quasars,” Rodríguez Hidalgo, Haas, Khatri, **Hall**, Quintero, Khatu, & Murray 2019, AAS meeting 233, #213.05
- “Active Galaxy Science in the LSST Deep-Drilling Fields: Footprints, Cadence Requirements, and Total-Depth Requirements,” Brandt, et al. 2018 (28 authors), (arXiv:1811.06542)
- “The Maunakea Spectroscopic Explorer Book 2018,” Hill, et al. 2018 (125 authors), (arXiv:1810.08695)
- “Automated Testing of Optical Fibres: Towards the Design of the Maunakea Spectroscopic Explorer Fibre Transmission System,” Monty, Jahandar, Lee, Venn, Bradley, Erickson, Crampton, Nicolov, Kielty, Mazoukh, & **Hall** 2018, Proc. SPIE, 107027I (2018) (arXiv:1807.09182)
- “Optimal scheduling and science delivery of spectra for millions of targets in thousands of fields: the operational concept of the Maunakea spectroscopic explorer (MSE),” Flagey, McConnachie, Szeto, **Hall**, Hill, & Hervieu 2018, Proc. SPIE, 107040V (2018) (arXiv:1807.08019)
- “The science calibration challenges of next generation highly multiplexed optical spectroscopy: the case of the Maunakea Spectroscopic Explorer,” McConnachie, Flagey, **Hall**, Saunders, Szeto, Hill, & Mignot, Proc. SPIE, 107041O (2018) (arXiv:1807.08029)
- “Maximising the sensitivity of next generation multi-object spectroscopy: system budget development and design optimizations for the Maunakea Spectroscopic Explorer,” McConnachie, Flagey, Szeto, Mignot, Hill, & **Hall**, Proc. SPIE, 1070522 (2018) (arXiv:1807.08025)
- “MSE FiTS: the ultimate multi-fiber optic transmission system,” Venn, Erickson, Crampton, Pawluczyk, Fournier, **Hall**, Bradley, McConnachie, Pazder, Jahandar, Monty, Lee, Mazoukh, Kielty, Nicolov, Szeto, & Hill, Proc. SPIE, 107027S (2018) (arXiv:1807.08036)
- “Investigations of Short-Timescale Outflow Variability in Quasars of the Sloan Digital Sky Survey,” Hemler, Grier, Brandt, **Hall**, Schneider, Shen, Fernandez-Trincado, & SDSS-RM Collaboration 2018, AAS meeting 231, #250.36

- “SDSS-V: Pioneering Panoptic Spectroscopy,” Kollmeier et al. 2017 (173 authors), (arXiv:1711.03234)
- “Lack of Radio-Emission in Quasars with Extremely High Velocity Outflows,” Quintero, Haas, Rodríguez Hidalgo, Khatri, & **Hall** 2017, Bulletin of the APS, Annual Meeting of the Far West Section E1.00002
- “The Detailed Science Case for the Maunakea Spectroscopic Explorer: the Composition and Dynamics of the Faint Universe,” McConnachie et al. 2016 (177 authors), (arXiv:1606.00043)
- “Exceptional X-ray Weak Quasars and Their Implications for Accretion Flows, Winds, and Broad Line Regions,” Brandt, Luo, **Hall**, & Wu 2016, Bulletin of the APS, April Meeting M18.00003
- “Exceptional X-ray Weak Quasars: Implications for Accretion Flows and Emission-Line Formation,” Brandt, Luo, **Hall** et al. 2016, AAS meeting 227, #318.04