

Cristobal Petrovich | Curriculum Vitae

Astronomy Department, Indiana University Bloomington

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Citizenship: Chilean/Croatian

Education

Princeton University <i>Ph.D. in Astrophysical Sciences</i> (advisor: Prof. Scott Tremaine)	Princeton, USA 09/2010 - 08/2015
Pontificia Universidad Católica de Chile <i>B. Sc. in Astronomy</i>	Santiago, Chile 03/2004 - 12/2008
Pontificia Universidad Católica de Chile <i>Mathematical Engineering (6-year professional degree)</i>	Santiago, Chile 03/2002 - 12/2009

Appointments

Indiana University <i>Associate Professor, Astronomy Department</i>	Bloomington, USA 1/2024 - present
Pontificia Universidad Católica de Chile <i>Assistant Professor, Institute of Astrophysics</i>	Santiago, Chile 11/2020 - 12/2023
University of Arizona <i>Bart J. Bok Postdoctoral Fellow</i>	Tucson, USA 09/2019 - 10/2020
Canadian Institute for Theoretical Astrophysics (CITA) <i>CITA Postdoctoral Fellow and Gruber Foundation Fellow</i>	Toronto, Canada 09/2015 - 08/2019

Awards and Fellowships

Bart J. Bok Fellowship , <i>Steward Observatory, University of Arizona</i>	2019 - 2020
51 Pegasi b Fellowship in planetary science <i>Three-year grant of \$375k awarded by the Heising-Simons Foundation (declined)</i>	2019
Jeffrey L. Bishop Fellowship <i>Awarded every-two years for research excellence in dynamics at CITA</i>	2016 - 2018
ProQuest Distinguished Dissertation award nomination <i>One PhD thesis selected in physical sciences and engineering from Princeton in 2015</i>	2016
The Gruber Foundation Fellowship <i>Prize of \$50k to support research at CITA, selected by the International Astronomical Union and awarded at the opening ceremony of the IAU General Assembly in Honolulu (link)</i>	2015 - 2019
CITA Fellowship , <i>Canadian Institute for Theoretical Astrophysics</i>	2015 - 2019

Grants (as PI)

FONDECYT Regular project 1210425 (\approx 100 million CLP, \approx USD 130,000)	2021-2025
Subvención Instalación Academia PAI77200076 (\approx 200 million CLP, \approx USD 260,000)	2020-2023
CASSACA joint resarch project PAI77200076 (\approx USD 130.000)	2022-2024
ALMA research funds (\approx 60 million CLP)	2023-2025

Research Interests

- Orbital migration and dynamical stability
- Exoplanet demographics
- Disk-planet interactions
- Planets in binary systems
- Gravitational wave sources
- Binaries in galactic center and triple systems
- Planetary systems around white dwarfs
- Thermal evolution of neutron stars

Publications

47 papers (38 as first to third author) | [ADS](#) citation count: +1,950, H-index= 24 (+2,350 and 26 in [Scholar](#))

24 first-author or student-led papers | [ADS](#) citation count: +1,070, H-index= 15

3 single-author papers with +340 citations in total/ 9 first-author papers with +50 citations

† = student-led paper under my supervision

(Research Impact List 2022/2023 ranking of the top 2% in science by John P.A. Ioannidis [[link](#)])

First-author or student-led.....

24. †Winter-Granić, M., **Petrovich, C.** & †Peña-Donaire 2023 “Binary mergers in the centers of galaxies: synergy between stellar flybys and tidal fields”, *The Astrophysical Journal* (Submitted, # of citations: 2)[[link](#)]
23. †Best, M., Sefilian, A. & **Petrovich, C.** 2023 “Influence of cold Jupiters in the formation of close-in planets I: planetesimal transport”, 2024, *The Astrophysical Journal*, 960, 89 (16 pp., # of citations: 7)[[link](#)]
22. †Espinoza-Retamal, J. I., Brahm, R., **Petrovich, C.** et al. 2023 “The Aligned Orbit of the Eccentric Proto Hot Jupiter TOI-3362b”, *The Astrophysical Journal Letters* (accepted, # of citations: 3)[[link](#)]
21. †Espinoza-Retamal, J. I., Zhu, W. & **Petrovich, C.** 2023 “Prospects from TESS and Gaia to Constrain the Flatness of Planetary Systems”, *The Astronomical Journal*, 166, 231 (10 pp., # of citations: 1)[[link](#)]
20. †Garrido-Deutelmöser, J., **Petrovich, C.** et al. “A gap-sharing planet pair shaping the crescent in HD 163296: a disk sculpted by a resonant chain”, 2023, *The Astrophysical Journal Letters*, 945, 37 (9 pp, # of citations: 4)[[link](#)] [[Sonified animation](#)]
19. †Garrido-Deutelmöser, J., **Petrovich, C.** et al. “Substructures in protoplanetary disks imprinted by compact planetary systems”, 2022, *The Astronomical Journal*, 932, 41 (12 pp, # of citations: 4) [[link](#)]
18. †Best, S. & **Petrovich, C.** “The chaotic history of the retrograde multi-planet system in K2-290A driven by distant stars”, 2022, *The Astrophysical Journal Letters*, 925, 2 (8 pp, # of citations: 5) [[link](#)] [[AASNova Highlight](#)]

17. †Nasim, I. T., **Petrovich, C.**, Nasim, A., Dosopoulou, F., and Antonini, F. "Formation of counter-rotating and highly eccentric massive black hole binaries in galaxy mergers", 2021, Monthly Notices of the Royal Astronomical Society, 503, 1 (12 pp, # of citations: 4) [[link](#)]
16. **Petrovich, C.**, Muñoz, D., Kratter, K. M., & Malhotra, R., "A disk-driven resonance as the origin of high inclinations of close-in planets", 2020, The Astrophysical Journal Letters, 902, 2 (10 pp, # of citations: 33) [[link](#)]
15. †Bub, M., & **Petrovich, C.**, "Compact-Object Mergers in the Galactic Center: Evolution in Triaxial Clusters", 2019, The Astrophysical Journal, 894, 15 (17 pp, # of citations: 15) [[link](#)]
14. **Petrovich, C.**, Wu, Y., & Ali-Dib, M., "Secular transport during disk dispersal: the case of Kepler-419", 2019, The Astronomical Journal, 157, 5 (13 pp, # of citations: 20) [[link](#)]
13. **Petrovich, C.**, †Deibert, E. & Wu, Y., "Ultra-short-period planets from secular chaos", 2019, The Astronomical Journal, 157, 180, (16 pp, # of citations: 50) [[link](#)]
12. †He, M., & **Petrovich, C.**, "On the stability and collisions in triple stellar systems", 2018, Monthly Notices of the Royal Astronomical Society, 474, 1 (12 pp, # of citations: 25) [[link](#)]
11. **Petrovich, C.** & Antonini, F., "Greatly enhanced merger rates of compact-object binaries in non-spherical nuclear star clusters", 2017, The Astrophysical Journal, 846, 146 (23 pp, # of citations: 141) [[link](#)]
10. **Petrovich, C.** & Muñoz, D., "Planetary engulfment as a trigger for white dwarf pollution", 2017, The Astrophysical Journal, 834, 116 (13 pp, # of citations: 72) [[link](#)]
9. **Petrovich, C.** & Tremaine, S., "Warm jupiters from secular planet-planet interactions", 2016, The Astrophysical Journal, 829, 132 (22 pp, # of citations: 95) [[link](#)]
8. **Petrovich, C.** "Stability and fates of hierarchical two-planet systems", 2015, The Astrophysical Journal, 808, 120 (15 pp, # of citations: 72) [[link](#)]
7. **Petrovich, C.** "Hot jupiters from coplanar high-eccentricity migration", 2015, The Astrophysical Journal, 805, 75, (16 pp, # of citations: 110) [[link](#)]
6. **Petrovich, C.** "Steady-state planet migration by the Kozai-Lidov mechanism in stellar binaries", 2015, The Astrophysical Journal, 799, 27 (27 pp, # of citations: 154) [[link](#)]
5. **Petrovich, C.**, Tremaine, S., and Rafikov, R. "Scattering outcomes of close-in planets: constraints on planet migration", 2014, The Astrophysical Journal, 786, 101, (10 pp, # of citations: 73) [[link](#)]
4. **Petrovich, C.**, Malhotra, R., and Tremaine, S. "Planets near mean-motion resonances", 2013, The Astrophysical Journal, 770, 24 (16 pp, # of citations: 97) [[link](#)]
3. **Petrovich, C.** and Rafikov, R. "Disk-satellite interaction in disks with density gaps", 2012, The Astrophysical Journal, 758, 33, (15 pp, # of citations: 23) [[link](#)]
2. **Petrovich, C.** and Reisenegger, A. "Long-period thermal oscillations in superfluid millisecond pulsars", 2011, Astronomy and Astrophysics, 528, A66, (8 pp, # of citations: 8) [[link](#)]
1. **Petrovich, C.** and Reisenegger, A. "Rotochemical heating in millisecond pulsars: modified Urca reactions with uniform Cooper pairing gaps", 2010, Astronomy and Astrophysics, 521, A77, (12 pp, # of citations: 31) [[link](#)]

Second and third-author.....

14. Muñoz, D., Stone, N., **Petrovich, C.**, & Rasio, F. "Eccentric Mergers of Intermediate-Mass Black Holes from Evection Resonances in AGN Disks", 2022 (submitted to PDR) [[link](#)]
13. Chen, C., Li, G., & **Petrovich, C.** 'Mutual Inclination of Ultra-Short-Period Planets with Time Varying Stellar J2-moment', 2022, The Astrophysical Journal, 930, 58, [[link](#)]
12. Stefansson, G., Mahadevan, S., **Petrovich, C.**, et al. "The Warm Neptune GJ 3470b has a Polar Orbit", 2022, The Astrophysical Journal Letters, 931, 15, [[link](#)]
11. Muñoz, D., & **Petrovich, C.**, "Kozai Migration Naturally Explains the White Dwarf Planet WD1856b", 2020, The Astrophysical Journal Letters, 904, 1, (8 pp) [[link](#)]
10. Ali-Dib, M. & **Petrovich, C.**, "Constraining protoplanetary disks with exoplanetary dynamics: Kepler-419 as an example", 2020, Monthly Notices of the Royal Astronomical Society, 499, 1 (9 pp) [[link](#)]
9. Yalinewich, A., & **Petrovich, C.**, "Nekhoroshev Estimates for the Survival Time of Tightly Packed Planetary Systems", 2020, The Astrophysical Journal Letters, 892, L11 (9 pp) [[link](#)]
8. Zhu, W., **Petrovich, C.**, Wu, Y., et al. "About 30% of Sun-like Stars Have Kepler-like Planetary Systems: A Study of their Intrinsic Architecture", 2018, The Astrophysical Journal, 860, 101 (15 pp) [[link](#)]
7. Antonini, F., Rodriguez, C. L., **Petrovich, C.**, & Fischer, C. "Precessional dynamics of black hole triples: binary mergers with near-zero effective spin", 2018, Monthly Notices of the Royal Astronomical Society, 480, L58 [[link](#)]
6. Hamers, A. S., Bar-Or, B, **Petrovich, C.**, & Antonini, F., "The impact of vector resonant relaxation on the evolution of binaries near a massive black hole: implications for gravitational wave sources", 2018, The Astrophysical Journal, 865, 2 (22 pp) [[link](#)]
5. Huang, C. X., **Petrovich, C.**, & Deibert, E. "Dynamically hot Super-Earths from outer giant planet scattering", 2017, The Astronomical Journal, 153, 210 (12 pp) [[link](#)]
4. Tamayo, D., Rein, H., **Petrovich, C.**, & Murray, N. "Convergent Migration Renders TRAPPIST-1 Long-lived", 2017, The Astrophysical Journal Letters, 840, L19 (6 pp) [[link](#)]
3. Simbulan, C., Tamayo, D., **Petrovich, C.**, Rein, H., & Murray, N. "Connecting HL Tau to the Observed Exoplanet Sample", 2017, Monthly Notices of the Royal Astronomical Society, 469, 3 [[link](#)]
2. Rafikov, R. and **Petrovich, C.** "The origin of the negative torque density in disk-satellite interaction", 2012, The Astrophysical Journal, 747, 24, (15 pp) [[link](#)]
1. González-Jiménez, N., **Petrovich, C.**, and Reisenegger, A. "Rotochemical heating of millisecond and classical pulsars with anisotropic and density-dependent superfluid gap models", 2015, Monthly Notices of the Royal Astronomical Society, 447, 3, (14 pp) [[link](#)]

Significant contribution (short author list).....

4. Sedaghati, E. et al. (including **Petrovich, C.**) "Orbital alignment of the eccentric warm Jupiter TOI-677 b", 2023, The Astrophysical Journal Letters (submitted)

3. Jackson, J. M., Dawson, R. I., Shannon, A. and **Petrovich, C.**, “Observable Predictions from Perturber-coupled High-eccentricity Tidal Migration of Warm Jupiters”, 2021, *The Astronomical Journal*, 161, 4
2. Freikh, R., Jang, H., Murray-Clay, R. A. and **Petrovich, C.** “Signatures of a planet-planet impacts phase in exoplanetary systems hosting giant planets”, 2019, *The Astrophysical Journal Letters*, 884, L47 [[link](#)]
1. Dong, R., Stone, J., Rafikov, R. and **Petrovich, C.** “Density waves excited by low-mass planets in protoplanetary disks. I. Linear regime”, 2012, *The Astrophysical Journal*, 747, 24, (17 pp) [[link](#)]

Nth-Author.....

5. Frazier, R., et al. (including **Petrovich, C.**) “NEID Reveals that The Young Warm Neptune TOI-2076 b Has a Low Obliquity”, 2023, *Astrophysical Journal Letters*, 944, 41 [[link](#)]
4. Jenkins, J., et al. (including **Petrovich, C.**) “TESS Discovery of an Ultra-Hot Neptune”, 2020, *Nature Astronomy*, 4, 1148 [[link](#)]
3. Brahm, R., et al. (including **Petrovich, C.**) “HD 1397b: a transiting warm giant planet orbiting a $V = 7.8$ mag sub-giant star discovered by TESS”, 2019, *The Astronomical Journal*, 158, 45 [[link](#)]
2. Tamayo, D., et al. (including **Petrovich, C.**) “A Machine Learns to Predict the Stability of Tightly Packed Planetary Systems”, 2016, *The Astrophysical Journal*, 832L, L22 [[link](#)]
1. Damasso, et al. (including **Petrovich, C.**) “The GAPS programme with HARPS-N at TNG. IX. The multi-planet system KELT-6: Detection of the planet KELT-6 c and measurement of the Rossiter-McLaughlin effect for KELT-6 b”, 2015, *Astronomy and Astrophysics*, 581, L6 [[link](#)]

Mentoring

Summary: **16** students supervised, leading to **11** publications (**10** student-led)

Graduate students

- *Marcy Best*, PhD Student at PUC, 2021 - (awarded the 2023 Raynor L. Duncombe Student Research Prize by the DDA, [link](#))
- *Juan Espinoza-Retamal*, PhD Student at PUC, 2021 -
- *Juan Garrido-Deutelmöser*, Masters student at PUC, 2021 - 2022 (→ PhD program at PUC and U. of Arizona)
- *Imran Nasim*, PhD student at Surrey University (advising one project), 2020 (→ Postdoctoral Fellow in Biomedical Informatics, Harvard Medical School)
- *Emily Deibert*, PhD student at UofT (advising 2 projects, → Gemini Science Fellow), 2016 - 2018

Undergraduate

- *Mila Winter*, bachelor thesis at PUC, 2023 (→ PhD program at Princeton University)
- *Agustin Heron*, bachelor thesis at PUC, 2023 (→ PhD program at Indiana University)
- *Ignacio Narea*, bachelor thesis at PUC, 2022 (→ Physics Masters at PUC)

- *Valentín Peña-Donaire*, bachelor thesis at PUC, 2022 (→ Masters Astrophysics at PUC)
- *Juan Sutil*, bachelor thesis at PUC, 2021 (→ Teaching program at PUC)
- *Fabian Soto*, bachelor thesis at PUC, 2021 (→ Industry job)
- *Fernanda Correa*, bachelor thesis at PUC, 2021 (→ PhD program at University of Chicago)
- *Mathew Bub*, undergraduate at UofT, 2019 (→ PhD program at Caltech)
- *Kai Wu*, undergraduate at Nanking University, 2018
- *Mingze Sun*, undergraduate at Nanking University (primarily supervised by Wei Zhu), 2018
- *Matthias He*, undergraduate at UofT 2016 - 2017 (→ PhD program at Penn State)

Postdocs

- *Carolina Charalambous*, MAS and FONDECYT postdoctoral fellow, 2023 -
- *Marco Muñoz*, CATA postdoctoral fellow, 2023 (→ assistant professor at Universidad de Atacama)

Teaching

- *Planets across the Universe*, lecturer (undergraduate-level course, ~ 70 students), 2022,2023
- *Planetary and stellar dynamics*, lecturer (graduate-level course), 2021, 2022, 2023
- Teaching certificate at PUC (100 hrs, ongoing, 3.5/5 modules completed), 2021-2023
- *Star and Planets*, Guest Lecturer at UofT (AST221, Prof. Wu, ~60 science majors), 2018
- *Summer lectures on exoplanets*, undergraduate students UofT (blackboard and slides sessions)
- *Blackboard talks*, pedagogical blackboard talks at CITA (x5), 2015 - 2019
- *Topics in Modern Astronomy*, Teaching Assistant at Princeton University, 2015
- Teaching Assistant at Catolica for: *General Relativity* (2008), *Quantum Physics II* (2007), *Quantum Physics I* (2006), *Physical Mathematical methods II* (2006), *Statistical Mechanics* (2005), *Mechanics I* (2005), *Electromagnetism* (2004)

Outreach

- Sonification project of the harmonic exoplanet system (planets and protoplanetary disk) in HD 163296 in collaboration with SYSTEM Sounds ([link](#)). Research results widely-spread in Chilean media (Newspapers, 4 personal appearances on TV and Radio shows) (e.g., [[link](#)], [[link](#)])
- Columnist for newspaper EMOL ([link](#))
- Acrux Festival of Poetry and Science at the Straight of Magellan, 2022 ([link](#))
- Observando el universo desde tu Casa: "Solar System and Exoplanets" (3 modules), 2021, ([link](#))
- IA-PUC te explica: Oumuamua, the first interstellar visitor (+15k views), 2021 ([link](#))
- Pannelist for Golden Webinars at PUC (X 2), 2021 ([link](#))

- o *'Sistemas planetarios: una historia forjada por el caos'*, Astro-Conferencias, Astro-Uami, Mexico virtual), 2020
- o *'Extreme Solar Systems'*, public talk at San Jose State University (invited by the Division of Planetary Science, AAS), San Jose, CA, 2018 ([link](#))

Leadership & Service

- o Reviewer for grants: NASA Exoplanets Research Program (XRP), US; FONDECYT, Chile (2021, 2022); Science and Technology Facilities Council (STFC), UK (2019); NASA Earth and Space Science Fellowships program, US (2018); CONICET grant, Argentina (2017, 2022)
- o Referee for +30 papers since 2014 in: *'The Astrophysical Journal'* (ApJ); *'The Astrophysical Journal Letters'* (ApJL); *'The Astronomical Journal'* (AJ) ; *'Planetary Science Journal '* (PSJ); *'The Monthly Notices of the Royal Astronomical Society'* (MNRAS); *'Astronomy and Astrophysics'* (A&A); *'Nature Astronomy'* (Nat. Astron); *'Nature Communications Physics'* (Nat. Comm. Phys); *'Physical Review D'* (Phys. Rev. D); *'Research in Astronomy and Astrophysics'* (RAA); *'Celestial Mechanics and Dynamical Astronomy'* (Celest. Mech. Dyn. Astron);
- o Conference organizer of *Open problems in the astrophysics of Gas Giant planets* to be held at the Chilean Patagonia on December 2023 ([link](#))
- o Member of The American Astronomical Society (AAS) and Division on Dynamical Astronomy (DDA)
- o Selection committee and chair (2022) for the Raynor L. Duncombe Student Research Prizes of the Division on Dynamical Astronomy of the AAS, 2020-2022
- o Head or Research and Postdocs at PUC (oversee grants and postdoc applications from the Institute, coordinate with the Office of Research), 2022 - ([link](#))
- o Postdoc coordinator at PUC (oversee activities and issues from the +20 postdocs at IA) 2022 - ([link](#))
- o Colloquium Organizer at PUC (+20 talks, mostly in-person), 2022
- o Graduate student selection committee at PUC (+100 applications, +10 interviews), 2021
- o Selection committee member for CITA postdoctoral fellowships, 2017-2018
- o CITA visitor committee member: co-organizer of seminars and visitor program, 2017-2019
- o Co-organizer of the bi-weekly Stars and Planets discussion at CITA, 2017
- o Co-organizer of the weekly dynamics discussion at CITA, 2016
- o Princeton Astrophysics 'Wunch' (Wednesday Lunch) Seminar Organizer, 2012

Presentations

Summary: 28 invited, +20 contributed

Invited conferences and meetings.....

7. Complex Planetary Systems II – Kavli-IAU Symposium 382, Namur, Belgium, July 2023
6. Extreme Solar Systems IV, Reykjavík, Iceland, August 2019

5. Astrophysics workshop at T.D. Lee Institute, Shanghai, China, January 2019
4. 49th Annual Meeting of the Division of Dynamical Astronomy (science and public talk), San Jose, CA, April 2018 ([link](#))
3. ICTP-SAIFR 5th Anniversary Symposium, Sao Paulo, Brazil, November 2016 ([link](#) talk)
2. Fellows at the Frontiers, Evanston, IL, August 2016
1. SOCHIAS XIII Annual Meeting, Antofagasta, Chile, March 2016

Invited seminars and colloquia

21. Astronomy Seminar, Universidad Diego Portales, Chile, May 2023
20. Astronomy Seminar, Universidad Andres Bello, Chile, May 2022
19. Astronomy Colloquium, Universidad de Concepcion, Chile, March 2021 (virtual)
18. Astronomy Colloquium, Pontificia Universidad de Chile, Chile, March 2020
17. Physics and Astronomy forum, UNVL, NV, November 2019
16. Astronomy colloquium, Steward Observatory, Tucson, AZ, August 2019
15. Center for Exoplanets and Habitable Worlds seminar, Penn State University, PA, April 2019
14. Astronomy Colloquium, Universidad de Chile, Chile, March 2019
13. Astronomy Colloquium, Universidad de Valparaiso, Chile, March 2019
12. Niels Bohr International Academy (job talk), Copenhagen, Denmark, January 2019
11. Astrophysical and Planetary Sciences Colloquium, UC Boulder, CO, April 2018
10. TAPIR seminar, Caltech, CA, January 2018
9. Astronomy Colloquium, PUC, Chile, October 2017
8. IAS Seminar, IAS, Princeton, NJ, September 2017
7. Astronomy Colloquium, Diego Portales, Chile, August 2016
6. Cornell Theoretical Astrophysics/Planetary Science Seminar, Ithaca, NY, June 2016
5. Astronomy Colloquium, Pontificia Universidad de Chile, Chile, March 2016
4. CITA Seminar, Toronto, Canada, July 2015
3. Division of Geological and Planetary Sciences Seminar, Caltech, Pasadena, CA, April 2015
2. CIPS Seminar, UC-Berkeley, Berkeley, CA, February 2013
1. Carnegies's DTM Astronomy Group Seminar, Washington, DC, April 2013

Contributed conferences and meetings

16. 54th Meeting of the Division on Dynamical Astronomy, East Lansing, MI, May 2023
15. XX Brazilian Colloquium of Orbital Dynamics, Brazil, December 2021 (virtual)
14. Distorted Astrophysical Discs, KICC, Cambridge, UK, May 2021 (virtual)
13. 51st Meeting of the Division on Dynamical Astronomy, Virtual Meeting August 2020 (virtual)

12. Theoretical and Computational Challenges in Planet Formation, CCA, NY, May 2019
11. New Horizons in Planetary Systems, Victoria, Canada, May 2019
10. Triple Evolution and Dynamics Trendy-2, Leiden, The Netherlands, September 2018
9. Numerical Integration Methods in Planetary Science, Toronto, Canada, July 2017
8. Formation and Dynamical Evolution of Exoplanets, Aspen, CO, March 2017
7. Exoplanets I, Davos, Switzerland, July 2016
6. Triple Evolution and Dynamics, Haifa, Israel, November 2014
5. 46th Annual Meeting of the Division for Planetary Sciences, Tucson, AZ, November 2014
4. IAU-Symposium: 'Complex Planetary Systems', Namur, Belgium, July 2014
3. 45th Meeting of the Division on Dynamical Astronomy, Philadelphia, PA, April 2014
2. Exoplanets in Multi-body systems in the Kepler era, Aspen, CO, February 2014
1. The origin of stars and their planetary systems, McMaster University, Canada June 2012

Contributed seminars (selected).....

6. Astronomy Seminar, UCLA, CA, January 2018
5. CfA High Energy Phenomena Seminar, CfA, Cambridge, MA, October 2017
4. CPS Seminar, Toronto, Canada, September 2017
3. Princeton Planet Lunch, Princeton University, Princeton, NJ, June 2017
2. ITC Seminar, Harvard University, Cambridge, MA, November 2014
1. Princeton Astrophysics "Wunch", Princeton University, Princeton, NJ, April 2014