August 21, 2023

Jessie C. Runnoe, Ph.D.

Department of Physics & Astronomy, Vanderbilt University,
VU Station B #351807, Nashville, TN 37235
Office: (615) 343-4148, Fax: (615) 343-7263
jessie.c.runnoe@vanderbilt.edu
http://astro.phy.vanderbilt.edu/~runnojc1/
J. Runnoe ADS Library

PROFESSIONAL HISTORY

Assistant Professor of Physics & Astronomy, Vanderbilt University	2019-present
Adjunct Professor of Physics, Fisk University	2023-present
Postdoctoral Fellow, University of Michigan	2016-2019
Mentor: Prof. Kayhan Gültekin	
Postdoctoral Scholar, The Pennsylvania State University	2013-2016
Mentors: Profs. Michael Eracleous, Steinn Sigurðsson	

EDUCATION

University of Wyoming	Ph.D., Physics	2013
Dissertation: A Multi-Wavelength Perspective on Quasar Fundamental Properties		
Mentor: Prof. Michael Brotherton		
University of Wyoming	M.S., Physics	2010
Whitman College	B.A., Physics-Astronomy	2008

RESEARCH

Refereed Journal Articles — Summary

Total of 72 peer-reviewed publications (including 14 as first author) with 3097 total citations and an *h*-index of 27. Five significant publications as lead author are listed here, with a full publication list included below.

1. **J. C. Runnoe**, S. Cales, J. J. Ruan, M. Eracleous, S. Anderson, Y. Shen, P. Green, E. Morganson, S. LaMassa, J. Greene, T. Dwelly, D. Schneider, A. Merloni, A. Georgakakis, and A. Roman-Lopes (2016), *"Now you see it, now you don't: the disappearing central engine of the quasar J1011+5442"*, MNRAS, 455, 1691-1701

2. **J. C. Runnoe**, M. Eracleous, A. Pennell, G. Mathes, T. Boroson, S. Sigurðsson, T. Bogdanović, J. Halpern, J. Liu, and S. Brown (2017), *"A large systematic search for close supermassive binary and rapidly recoiling black holes - III. Radial velocity variations"*, MNRAS, 468, 1683-1702

3. **J. C. Runnoe**, M. Eracleous, G. Mathes, A. Pennell, T. Boroson, S. Sigurðsson, T. Bogdanović, J. Halpern, and J. Liu (2015), *"A Large Systematic Search for Close Supermassive Binary and Rapidly Recoiling Black Holes. II. Continued Spectroscopic Monitoring and Optical Flux Variability"*, ApJS, 221, 7

4. **J. C. Runnoe** and T. Boroson (2021), *"Orientation and Accretion in a Representative Sample of Active Galactic Nuclei"*, ApJ, 919, 62

5. **J. C. Runnoe**, M. Brotherton, and Z. Shang (2012), *"Updating quasar bolometric luminosity corrections"*, MNRAS, 422, 478-493

TEACHING

Courses Taught

ASTR 8080 — *Astronomical Techniques: Data Mining in Large Astronomical Surveys*
Fall 2019, Fall 2020, Spring 2022
Graduate astrophysics data mining and big-data survey techniques.

ASTR 8060 — *Astronomical Techniques: Observational Methods in Astronomy*
Spring 2021, Fall 2021
Graduate astrophysics telescope design and observation planning.
Uses pre-existing course number, but content is entirely new.

ASTR 1050 — *Survey of Astronomy (U. Wyoming)*
Summer 2012
Introduction to astronomy for non-majors.

Guest Lecturer

Vanderbilt Pulsar Timing Array School
Summer 2021

ASTR 8001 — *Order of Magnitude Astrophysics*
Fall 2021
Order-of-magnitude estimates on astrophysical problems.

Supervisory Research Training

At Vanderbilt unless otherwise noted.

Postdoctoral Fellows — Sara Frederick, Astrophysics, 2021-present
Aaron Stemo, Astrophysics, 2021-present

Graduate Students — (*directing dissertation research)*
Collin Dabbieri, Astrophysics, 2020-present
Carolyn Drake, Astrophysics, 2020-present
(*secondary research mentor)*
Adi Foord (UM), 2016-2019
Mallory Molina (PSU), 2014-2016

Fisk-Vanderbilt Bridge Students — Niana Mohammed, Fisk MS, 2020-2022

Undergraduate Students — Hanna Harmon (Wellesley), 2023
Rachael Quinby (Middle Tennessee State), 2023
Grace Ward, 2023
Alex Diefenbach, 2023
Nathalie Cuestas (Dartmouth), 2022
Matthew Schwarz, 2020-2021

Jeffrey Roh, 2021
Adam Crutcher (UM),
Allison Pennell (PSU), 2014-2017
Stephanie Brown (PSU), 2014-2016
Vikram Singh (U. Wyo), 2012-2016
Gavin Mathes (PSU), 2013-2014

DIVERSITY, EQUITY, INCLUSION, AND OUTREACH

Diversity, Equity, and Inclusion

Fisk-Vanderbilt Bridge Steering Committee, 2023-present
SOC, EMIT Summer School, 2023
Steering Committee, Vanderbilt EMIT graduate training program, 2022-present
Mentor, Fisk-Vanderbilt Bridge Program, 2019-2022
co-PI, APS-IDEA Network Vanderbilt Team, 2020-2022
Organizer, Vanderbilt Seminar: *"Decolonizing Academia"* by Jorge Moreno, 2021

Outreach

Volunteer, AstroFest, PSU, 2014-2016
Judge, Graduate Exhibition, PSU, 2015
Volunteer, Family Weekend, PSU, 2013
Volunteer, WIRO Open House, U. Wyoming, 2008-2012
Judge, Wyoming State Science Fair, U. Wyoming, 2012
Counselor, Wyoming Astro Camp, U. Wyoming, 2007-2011
Teacher, Planetarium Shows, Whitman College, 2005-2008

SERVICE

Vanderbilt Department of Physics & Astronomy

Member, Long-Range Planning Committee, 2021-present
Member, Colloquium Committee, 2019-present
Member, Astronomy Graduate Program Committee, 2019-present
Primary representative, Association of Universities For Research in Astronomy (AURA), 2019-present

Professional

Reviewer of grant proposals and journal articles
National Science Foundation AAPF, NASA FINESST
Science, Astrophysical Journal, Monthly Notices of the Royal Astronomical Society
Telescope time allocation committee panel
Chandra X-ray Observatory, Hubble Space Telescope, NOIRLab
Conference organizer
Windows on the Universe: Establishing the Infrastructure for a Collaborative Multi-messenger Ecosystem, 2023
Exploring the Transient Universe with the Nancy Grace Roman Space Telescope, 2022

Black Hole Formation, Accretion, and Outflows Through Cosmic Time, 2021
Unveiling the Physics Behind Extreme AGN Variability, 2017

Professional Affiliations

LISA Consortium, Associate Member	2020-present
NANOGrav Associate Member	2019-present
Rubin Observatory AGN Science Collaboration, Member	2017-present
Sloan Digital Sky Survey IV/V, Member	2016-present
American Astronomical Society, Member	2011-present

PUBLICATIONS

Refereed Journal Articles — Full List

Total of 72 peer-reviewed publications (including 14 as first author) with 3097 total citations and an *h*-index of 27.

1. P. Amaro-Seoane, J. Andrews, M. Arca Sedda, A. Askar, Q. Baghi, R. Balasov, I. Bartos, S. S. Bavera, J. Bellovary, C. P. L. Berry, E. Berti, S. Bianchi, L. Blecha, S. Blondin, T. Bogdanović, S. Boissier, M. Bonetti, S. Bonoli, E. Bortolas, K. Breivik, P. R. Capelo, L. Caramete, F. Cattorini, M. Charisi, S. Chaty, X. Chen, M. Chruślińska, A. J. K. Chua, R. Church, M. Colpi, D. D'Orazio, C. Danielski, M. B. Davies, P. Dayal, A. De Rosa, A. Derdzinski, K. Destounis, M. Dotti, I. Dutan, I. Dvorkin, G. Fabj, T. Foglizzo, S. Ford, J.-B. Fouvry, A. Franchini, T. Fragos, C. Fryer, M. Gaspari, D. Gerosa, L. Graziani, P. Groot, M. Habouzit, D. Haggard, Z. Haiman, W.-B. Han, A. Istrate, P. H. Johansson, F. M. Khan, T. Kimpson, K. Kokkotas, A. Kong, V. Korol, K. Kremer, T. Kupfer, A. Lamberts, S. Larson, M. Lau, D. Liu, N. Lloyd-Ronning, G. Lodato, A. Lupi, C.-P. Ma, T. Maccarone, I. Mandel, A. Mangiagli, M. Mapelli, S. Mathis, L. Mayer, S. McGee, B. McKernan, M. C. Miller, D. F. Mota, M. Mumpower, S. S. Nasim, G. Nelemans, S. Noble, F. Pacucci, F. Panessa, V. Paschalidis, H. Pfister, D. Porquet, J. Quenby, A. Ricarte, F. K. Röpke, J. Regan, S. Rosswog, A. Ruiter, M. Ruiz, **J. Runnoe**, R. Schneider, J. Schnittman, A. Secunda, A. Sesana, N. Seto, L. Shao, S. Shapiro, C. Sopuerta, N. C. Stone, A. Suvorov, N. Tamanini, T. Tamfal, T. Tauris, K. Temmink, J. Tomsick, S. Toonen, A. Torres-Orjuela, M. Toscani, A. Tsokaros, C. Unal, V. Vázquez-Aceves, R. Valiante, M. van Putten, J. van Roestel, C. Vignali, M. Volonteri, K. Wu, Z. Younsi, S. Yu, S. Zane, L. Zwick, F. Antonini, V. Baibhav, E. Barausse, A. Bonilla Rivera, M. Branchesi, G. Branduardi-Raymont, K. Burdge, S. Chakraborty, J. Cuadra, K. Dage, B. Davis, S. E. de Mink, R. Decarli, D. Doneva, S. Escoffier, P. Gandhi, F. Haardt, C. O. Lousto, S. Nissanke, J. Nordhaus, R. O'Shaughnessy, S. Portegies Zwart, A. Pound, F. Schussler, O. Sergijenko, A. Spallicci, D. Vernieri, and A. Vigna-Gómez (2023), "Astrophysics with the Laser Interferometer Space Antenna", Living Reviews in Relativity, 26, 2 (pp), https://doi.org/10.1007/s41114-022-00041-y, arXiv:2203.06016.

2. T. Ha, C. Dix, B. M. Matthews, O. Shemmer, M. S. Brotherton, A. D. Myers, G. T. Richards, J. Maithil, S. F. Anderson, W. N. Brandt, A. M. Diamond-Stanic, X. Fan, S. C. Gallagher, R. Green, P. Lira, B. Luo, H. Netzer, R. M. Plotkin, **J. C. Runnoe**, D. P. Schneider, M. A. Strauss, B. Trakhtenbrot, and J. Wu (2023), "Shedding New Light on

Weak Emission-line Quasars in the C IV-Hβ Parameter Space", The Astrophysical Journal, 950, 97 (12 pp), https://doi.org/10.3847/1538-4357/acd04d, arXiv:2304.04783.

3. B. M. Matthews, C. Dix, O. Shemmer, M. S. Brotherton, A. D. Myers, I. Andruchow, W. N. Brandt, S. C. Gallagher, R. Green, P. Lira, J. N. McLane, R. M. Plotkin, G. T. Richards, **J. C. Runnoe**, D. P. Schneider, and M. A. Strauss (2023), "Gemini Near Infrared Spectrograph-Distant Quasar Survey: Augmented Spectroscopic Catalog and a Prescription for Correcting UV-based Quasar Redshifts", The Astrophysical Journal, 950, 95 (15 pp), https://doi.org/10.3847/1538-4357/acd04c, arXiv:2304.09964.

4. L. B. Fries, J. R. Trump, M. C. Davis, C. J. Grier, Y. Shen, S. F. Anderson, T. Dwelly, M. Eracleous, Y. Homayouni, K. Horne, M. Krumpe, S. Morrison, **J. C. Runnoe**, B. Trakhtenbrot, R. J. Assef, W. N. Brandt, J. Brownstein, C. Dabbieri, A. Fix, G. Fonseca Alvarez, S. Frederick, P. B. Hall, A. M. Koekemoer, J. I.-H. Li, X. Liu, M. L. Martínez-Aldama, C. Ricci, D. P. Schneider, H. W. Sharp, M. J. Temple, Q. Yang, G. Zeltyn, and D. Bizyaev (2023), "The SDSS-V Black Hole Mapper Reverberation Mapping Project: Unusual Broad-line Variability in a Luminous Quasar", The Astrophysical Journal, 948, 5 (20 pp), https://doi.org/10.3847/1538-4357/acbfb7, arXiv:2301.10252.

5. G. Zeltyn, B. Trakhtenbrot, M. Eracleous, **J. Runnoe**, J. R. Trump, J. Stern, Y. Shen, L. Hernández-García, F. E. Bauer, Q. Yang, T. Dwelly, C. Ricci, P. Green, S. F. Anderson, R. J. Assef, M. Guolo, C. MacLeod, M. C. Davis, L. Fries, S. Gezari, N. A. Grogin, D. Homan, A. M. Koekemoer, M. Krumpe, S. LaMassa, X. Liu, A. Merloni, M. L. Martínez-Aldama, D. P. Schneider, M. J. Temple, J. R. Brownstein, H. Ibarra-Medel, J. Burke, C. Pellegrino, and J. A. Kollmeier (2022), "A Transient "Changing-look" Active Galactic Nucleus Resolved on Month Timescales from First-year Sloan Digital Sky Survey V Data", The Astrophysical Journal, 939, L16 (9 pp), https://doi.org/10.3847/2041-8213/ac9a47, arXiv:2210.07258.

6. P. J. Green, L. Pulgarin-Duque, S. F. Anderson, C. L. MacLeod, M. Eracleous, J. J. Ruan, **J. Runnoe**, M. Graham, B. R. Roulston, D. P. Schneider, A. Ahlf, D. Bizyaev, J. R. Brownstein, S. J. del Casal, S. A. Dodd, D. Hoover, C. Matt, A. Merloni, K. Pan, A. Ramirez, and M. Ridder (2022), "The Time Domain Spectroscopic Survey: Changing-look Quasar Candidates from Multi-epoch Spectroscopy in SDSS-IV", The Astrophysical Journal, 933, 180 (22 pp), https://doi.org/10.3847/1538-4357/ac743f, arXiv:2201.09123.

7. M. Charisi, S. R. Taylor, **J. Runnoe**, T. Bogdanovic, and J. R. Trump (2021), "Multi-messenger time-domain signatures of supermassive black hole binaries", Monthly Notices of the Royal Astronomical Society, 510, 5929-5944 (16 pp), https://doi.org/10.1093/mnras/stab3713, arXiv:2110.14661.

8. **J. C. Runnoe** and T. Boroson (2021), "Orientation and Accretion in a Representative Sample of Active Galactic Nuclei", The Astrophysical Journal, 919, 62 (18 pp), https://doi.org/10.3847/1538-4357/ac0c18, arXiv:2004.07196.

9. **J. C. Runnoe**, K. Gültekin, D. Rupke, and A. López-Sepulcre (2021), "Properties of cold molecular gas in four type-1 active galaxies hosting outflows", Monthly Notices of

the Royal Astronomical Society, 505, 6017-6036 (20 pp), https://doi.org/10.1093/mnras/stab1579, arXiv:2105.13460.

10. P. Breiding, S. Burke-Spolaor, M. Eracleous, T. Bogdanović, T. J. W. Lazio, **J. Runnoe**, and S. Sigurdsson (2021), "The Search for Binary Supermassive Black Holes among Quasars with Offset Broad Lines Using the Very Long Baseline Array", The Astrophysical Journal, 914, 37 (11 pp), https://doi.org/10.3847/1538-4357/abfa9a, arXiv:2103.14176.

11. X. Jin, J. J. Ruan, D. Haggard, M.-J. Gingras, J. Hountalas, C. L. MacLeod, S. F. Anderson, A. Doan, M. Eracleous, P. J. Green, and **J. C. Runnoe** (2021), "Probing the Disk-Corona Systems and Broad-line Regions of Changing-look Quasars with X-Ray and Optical Observations", The Astrophysical Journal, 912, 20 (27 pp), https://doi.org/10.3847/1538-4357/abeb17, arXiv:2103.02245.

12. K. Horne, G. De Rosa, B. M. Peterson, A. J. Barth, J. Ely, M. M. Fausnaugh, G. A. Kriss, L. Pei, M. C. Bentz, E. M. Cackett, R. Edelson, M. Eracleous, M. R. Goad, C. J. Grier, J. Kaastra, C. S. Kochanek, Y. Krongold, S. Mathur, H. Netzer, D. Proga, N. Tejos, M. Vestergaard, C. Villforth, S. M. Adams, M. D. Anderson, P. Arévalo, T. G. Beatty, V. N. Bennert, A. Bigley, S. Bisogni, G. A. Borman, T. A. Boroson, M. C. Bottorff, W. N. Brandt, A. A. Breeveld, M. Brotherton, J. E. Brown, J. S. Brown, G. Canalizo, M. T. Carini, K. I. Clubb, J. M. Comerford, E. M. Corsini, D. M. Crenshaw, S. Croft, K. V. Croxall, E. Dalla Bontà, A. J. Deason, M. Dehghanian, A. De Lorenzo-Cáceres, K. D. Denney, M. Dietrich, C. Done, N. V. Efimova, P. A. Evans, G. J. Ferland, A. V. Filippenko, K. Flatland, O. D. Fox, E. Gardner, E. L. Gates, N. Gehrels, S. Geier, J. M. Gelbord, L. Gonzalez, V. Gorjian, J. E. Greene, D. Grupe, A. Gupta, P. B. Hall, C. B. Henderson, S. Hicks, E. Holmbeck, T. W.-S. Holoien, T. Hutchison, M. Im, J. J. Jensen, C. A. Johnson, M. D. Joner, J. Jones, S. Kaspi, P. L. Kelly, J. A. Kennea, M. Kim, S. Kim, S. C. Kim, A. King, S. A. Klimanov, K. T. Korista, M. W. Lau, J. C. Lee, D. C. Leonard, M. Li, P. Lira, C. Lochhaas, Z. Ma, F. MacInnis, M. A. Malkan, E. R. Manne-Nicholas, J. C. Mauerhan, R. McGurk, I. M. McHardy, C. Montuori, L. Morelli, A. Mosquera, D. Mudd, F. Müller-Sánchez, S. V. Nazarov, R. P. Norris, J. A. Nousek, M. L. Nguyen, P. Ochner, D. N. Okhmat, A. Pancoast, I. Papadakis, J. R. Parks, M. T. Penny, A. Pizzella, R. W. Pogge, R. Poleski, J.-U. Pott, S. E. Rafter, H.-W. Rix, **J. Runnoe**, D. A. Saylor, J. S. Schimoia, K. Schnülle, B. Scott, S. G. Sergeev, B. J. Shappee, I. Shivvers, M. Siegel, G. V. Simonian, A. Siviero, A. Skielboe, G. Somers, M. Spencer, D. Starkey, D. J. Stevens, H.-I. Sung, J. Tayar, T. Treu, C. S. Turner, P. Uttley, J. Van Saders, L. Vican, S. Villanueva, Y. Weiss, J.-H. Woo, H. Yan, S. Young, H. Yuk, W. Zheng, W. Zhu, and Y. Zu (2021), "Space Telescope and Optical Reverberation Mapping Project. IX. Velocity-Delay Maps for Broad Emission Lines in NGC 5548", The Astrophysical Journal, 907, 76 (19 pp), https://doi.org/10.3847/1538-4357/abce60, arXiv:2003.01448.

13. B. M. Matthews, O. Shemmer, C. Dix, M. S. Brotherton, A. D. Myers, I. Andruchow, W. N. Brandt, G. A. Ferrero, S. C. Gallagher, R. Green, P. Lira, R. M. Plotkin, G. T. Richards, **J. C. Runnoe**, D. P. Schneider, Y. Shen, M. A. Strauss, and B. J. Wills (2021), "Placing High-redshift Quasars in Perspective: A Catalog of Spectroscopic Properties

from the Gemini Near Infrared Spectrograph-Distant Quasar Survey", The Astrophysical Journal Supplement Series, 252, 15 (11 pp), https://doi.org/10.3847/1538-4365/abc705, arXiv:2011.10895.

14. A. Foord, K. Gültekin, **J. C. Runnoe**, and M. J. Koss (2021), "AGN Triality of Triple Mergers: Detection of Faint X-Ray Point Sources", The Astrophysical Journal, 907, 71 (20 pp), https://doi.org/10.3847/1538-4357/abce5d, arXiv:2012.00761.

15. A. Foord, K. Gültekin, **J. C. Runnoe**, and M. J. Koss (2021), "AGN Triality of Triple Mergers: Multiwavelength Classifications", The Astrophysical Journal, 907, 72 (14 pp), https://doi.org/10.3847/1538-4357/abce5e, arXiv:2012.00769.

16. J. Maithil, **J. C. Runnoe**, M. S. Brotherton, J. F. Wardle, B. J. Wills, M. DiPompeo, and C. De Breuck (2020), "Investigating Orientation Effects Considering Angular Resolution for a Sample of Radio-loud Quasars Using VLA Observations", The Astrophysical Journal, 904, 179 (29 pp), https://doi.org/10.3847/1538-4357/abc257, arXiv:2010.08668.

17. P. R. Williams, A. Pancoast, T. Treu, B. J. Brewer, B. M. Peterson, A. J. Barth, M. A. Malkan, G. De Rosa, K. Horne, G. A. Kriss, N. Arav, M. C. Bentz, E. M. Cackett, E. Dalla Bontà, M. Dehghanian, C. Done, G. J. Ferland, C. J. Grier, J. Kaastra, E. Kara, C. S. Kochanek, S. Mathur, M. Mehdipour, R. W. Pogge, D. Proga, M. Vestergaard, T. Waters, S. M. Adams, M. D. Anderson, P. Arévalo, T. G. Beatty, V. N. Bennert, A. Bigley, S. Bisogni, G. A. Borman, T. A. Boroson, M. C. Bottorff, W. N. Brandt, A. A. Breeveld, M. Brotherton, J. E. Brown, J. S. Brown, G. Canalizo, M. T. Carini, K. I. Clubb, J. M. Comerford, E. M. Corsini, D. M. Crenshaw, S. Croft, K. V. Croxall, A. J. Deason, A. De Lorenzo-Cáceres, K. D. Denney, M. Dietrich, R. Edelson, N. V. Efimova, J. Ely, P. A. Evans, M. M. Fausnaugh, A. V. Filippenko, K. Flatland, O. D. Fox, E. Gardner, E. L. Gates, N. Gehrels, S. Geier, J. M. Gelbord, L. Gonzalez, V. Gorjian, J. E. Greene, D. Grupe, A. Gupta, P. B. Hall, C. B. Henderson, S. Hicks, E. Holmbeck, T. W.-S. Holoien, T. Hutchison, M. Im, J. J. Jensen, C. A. Johnson, M. D. Joner, J. Jones, S. Kaspi, P. L. Kelly, J. A. Kennea, M. Kim, S. Kim, S. C. Kim, A. King, S. A. Klimanov, C. Knigge, Y. Krongold, M. W. Lau, J. C. Lee, D. C. Leonard, M. Li, P. Lira, C. Lochhaas, Z. Ma, F. MacInnis, E. R. Manne-Nicholas, J. C. Mauerhan, R. McGurk, I. M. McHardy, C. Montuori, L. Morelli, A. Mosquera, D. Mudd, F. Müller-Sánchez, S. V. Nazarov, R. P. Norris, J. A. Nousek, M. L. Nguyen, P. Ochner, D. N. Okhmat, I. Papadakis, J. R. Parks, L. Pei, M. T. Penny, A. Pizzella, R. Poleski, J.-U. Pott, S. E. Rafter, H.-W. Rix, **J. Runnoe**, D. A. Saylor, J. S. Schimoia, B. Scott, S. G. Sergeev, B. J. Shappee, I. Shivvers, M. Siegel, G. V. Simonian, A. Siviero, A. Skielboe, G. Somers, M. Spencer, D. Starkey, D. J. Stevens, H.-I. Sung, J. Tayar, N. Tejos, C. S. Turner, P. Uttley, J. Van Saders, S. A. Vaughan, L. Vican, S. Villanueva, C. Villforth, Y. Weiss, J.-H. Woo, H. Yan, S. Young, H. Yuk, W. Zheng, W. Zhu, and Y. Zu (2020), "Space Telescope and Optical Reverberation Mapping Project. XII. Broad-line Region Modeling of NGC 5548", The Astrophysical Journal, 902, 74 (21 pp), https://doi.org/10.3847/1538-4357/abbad7, arXiv:2010.00594.

18. K. Nguyen, T. Bogdanović, **J. C. Runnoe**, S. R. Taylor, A. Sesana, M. Eracleous, and S. Sigurdsson (2020), "Pulsar Timing Array Constraints on the Merger Timescale of Subparsec Supermassive Black Hole Binary Candidates", The Astrophysical Journal, 900, L42 (7 pp), https://doi.org/10.3847/2041-8213/abb2ab, arXiv:2006.12518.

19. K. Nguyen, T. Bogdanović, **J. C. Runnoe**, M. Eracleous, S. Sigurdsson, and T. Boroson (2020), "Emission Signatures from Subparsec Binary Supermassive Black Holes. III. Comparison of Models with Observations", The Astrophysical Journal, 894, 105 (24 pp), https://doi.org/10.3847/1538-4357/ab88b5, arXiv:1908.01799.

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47. M. S. Brotherton, V. Singh, and **J. Runnoe** (2015), "Orientation and quasar black hole mass estimation", Monthly Notices of the Royal Astronomical Society, 454, 3864-3871 (8 pp), https://doi.org/10.1093/mnras/stv2186, arXiv:1509.06468.

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Monitoring and Optical Flux Variability", The Astrophysical Journal Supplement Series, 221, 7 (24 pp), https://doi.org/10.1088/0067-0049/221/1/7, arXiv:1509.02575.

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51. H. A. Kobulnicky, D. C. Kiminki, M. J. Lundquist, J. Burke, J. Chapman, E. Keller, K. Lester, E. K. Rolen, E. Topel, A. Bhattacharjee, R. A. Smullen, C. A. Vargas Álvarez, **J. C. Runnoe**, D. A. Dale, and M. M. Brotherton (2014), "Toward Complete Statistics of Massive Binary Stars: Penultimate Results from the Cygnus OB2 Radial Velocity Survey", The Astrophysical Journal Supplement Series, 213, 34 (24 pp), https://doi.org/10.1088/0067-0049/213/2/34, arXiv:1406.6655.

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54. **J. C. Runnoe**, Z. Shang, and M. S. Brotherton (2013), "The orientation dependence of quasar spectral energy distributions", Monthly Notices of the Royal Astronomical Society, 435, 3251-3261 (11 pp), https://doi.org/10.1093/mnras/stt1528, arXiv:1309.0182.

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56. M. A. DiPompeo, **J. C. Runnoe**, A. D. Myers, and T. A. Boroson (2013), "Does Size Matter? The Underlying Intrinsic Size Distribution of Radio Sources and Implications for Unification by Orientation", The Astrophysical Journal, 774, 24 (12 pp), https://doi.org/10.1088/0004-637X/774/1/24, arXiv:1307.1731.

57. **J. C. Runnoe**, R. Ganguly, M. S. Brotherton, and M. A. DiPompeo (2013), "Rest-frame optical properties of luminous, radio-selected broad absorption line quasars", Monthly Notices of the Royal Astronomical Society, 433, 1778-1788 (11 pp), https://doi.org/10.1093/mnras/stt852, arXiv:1305.6603.

58. **J. C. Runnoe**, M. S. Brotherton, Z. Shang, B. J. Wills, and M. A. DiPompeo (2013), "The orientation dependence of quasar single-epoch black hole mass scaling relationships", Monthly Notices of the Royal Astronomical Society, 429, 135-149 (15 pp), https://doi.org/10.1093/mnras/sts322, arXiv:1211.3984.

59. M. A. DiPompeo, **J. C. Runnoe**, M. S. Brotherton, and A. D. Myers (2013), "An Infrared Excess Identified in Radio-loud Broad Absorption Line Quasars", The Astrophysical Journal, 762, 111 (6 pp), https://doi.org/10.1088/0004-637X/762/2/111, arXiv:1211.4837.

60. M. A. DiPompeo, M. S. Brotherton, S. L. Cales, and **J. C. Runnoe** (2012), "The rest-frame ultraviolet properties of radio-loud broad absorption line quasars", Monthly Notices of the Royal Astronomical Society, 427, 1135-1152 (18 pp), https://doi.org/10.1111/j.1365-2966.2012.21971.x, arXiv:1209.1417.

61. **J. C. Runnoe**, M. S. Brotherton, and Z. Shang (2012), "Updating quasar bolometric luminosity corrections - II. Infrared bolometric corrections", Monthly Notices of the Royal Astronomical Society, 426, 2677-2688 (12 pp), https://doi.org/10.1111/j.1365-2966.2012.21644.x, arXiv:1207.2124.

62. H. A. Kobulnicky, R. A. Smullen, D. C. Kiminki, **J. C. Runnoe**, E. S. Wood, G. Long, M. J. Alexander, M. J. Lundquist, and C. Vargas-Alvarez (2012), "A Fresh Catch of Massive Binaries in the Cygnus OB2 Association", The Astrophysical Journal, 756, 50 (13 pp), https://doi.org/10.1088/0004-637X/756/1/50, arXiv:1206.6742.

63. B. Tang, Z. Shang, Q. Gu, M. S. Brotherton, and **J. C. Runnoe** (2012), "The Optical and Ultraviolet Emission-line Properties of Bright Quasars with Detailed Spectral Energy Distributions", The Astrophysical Journal Supplement Series, 201, 38 (20 pp), https://doi.org/10.1088/0067-0049/201/2/38, arXiv:1207.2539.

64. **J. C. Runnoe**, M. S. Brotherton, and Z. Shang (2012), "Updating quasar bolometric luminosity corrections", Monthly Notices of the Royal Astronomical Society, 422, 478-493 (16 pp), https://doi.org/10.1111/j.1365-2966.2012.20620.x, arXiv:1201.5155.

65. Z. Shang, M. S. Brotherton, B. J. Wills, D. Wills, S. L. Cales, D. A. Dale, R. F. Green, **J. C. Runnoe**, R. S. Nemmen, S. C. Gallagher, R. Ganguly, D. C. Hines, B. J. Kelly, G. A. Kriss, J. Li, B. Tang, and Y. Xie (2011), "The Next Generation Atlas of Quasar Spectral Energy Distributions from Radio to X-Rays", The Astrophysical Journal Supplement Series, 196, 2 (23 pp), https://doi.org/10.1088/0067-0049/196/1/2, arXiv:1107.1855.

Refereed Journal Articles — Reviews

66. A. De Rosa, C. Vignali, T. Bogdanović, P. R. Capelo, M. Charisi, M. Dotti, B. Husemann, E. Lusso, L. Mayer, Z. Paragi, **J. Runnoe**, A. Sesana, L. Steinborn, S. Bianchi, M. Colpi, L. del Valle, S. Frey, K. É. Gabányi, M. Giustini, M. Guainazzi, Z. Haiman, N. Herrera Ruiz, R. Herrero-Illana, K. Iwasawa, S. Komossa, D. Lena, N. Loiseau, M. Perez-Torres, E. Piconcelli, and M. Volonteri (2019), "The quest for dual and binary supermassive black holes: A multi-messenger view", New Astronomy

Reviews, 86, 101525 (pp), https://doi.org/10.1016/j.newar.2020.101525, arXiv:2001.06293.

Book Chapters

67. A. Zabludoff, I. Arcavi, S. La Massa, H. B. Perets, B. Trakhtenbrot, B. A. Zauderer, K. Auchettl, J. L. Dai, K. D. French, T. Hung, E. Kara, G. Lodato, W. P. Maksym, Y. Qin, E. Ramirez-Ruiz, N. Roth, **J. C. Runnoe**, and T. Wevers (2021), "Distinguishing Tidal Disruption Events from Impostors", Space Science Reviews, 217, 54 (pp), https://doi.org/10.1007/s11214-021-00829-4, arXiv:2103.12150.

Works in progress

68. **J. C. Runnoe**, M. Eracleous, T. Bogdanović, J. P. Halpern, S. Sigurðsson, and H. Flohic, "A large systematic search for close supermassive binary and rapidly recoiling black holes - IV. Ultraviolet Spectroscopy". In preparation (early draft).

69. C. Dabbieri, **J. C. Runnoe**, and the SDSS IV Collaboration, "A Structure Function for Variability of Hβ Radial Velocity of Sloan Digital Sky Survey Quasars". In preparation (early draft).

70. C. Drake, **J. C. Runnoe**, M. Eracleous, and T. Bogdanović, "A census of the LISA error volume". In preparation (early draft).

In the Media

1. **J. C. Runnoe** (2017), "Galaxy evolution: A dusty black hole duo", Nature Astronomy News & Views, https://www.nature.com/articles/s41550-017-0193

2. Palca, J. (2016), "Solving the Mystery of the Disappearing Quasars", National Public Radio, https://www.npr.org/sections/thetwo-way/2016/02/23/467826553/solving-the-mystery-of-the-disappearing-quasar

3. Hall, S. (2015), "The Case of the Disappearing Quasar", Scientific American, https://www.scientificamerican.com/article/the-case-of-the-disappearing-quasars/

Invited Presentations — Conferences

1. Sloan Digital Sky Survey V Collaboration Meeting, New York, NY, USA, July 31, 2023, *"Spectroscopic Variability of Active Galaxies and Quasars 101"*

2. European Astronomical Society Annual Meeting, Krakow, Poland, July 13, 2023, *"Observational properties of supermassive black hole binaries"*

3. European Astronomical Society Annual Meeting, Krakow, Poland, July 12, 2023, *"The TDE-AGN Connection: AGN variability and peculiar transients"*

4. Giant Magellan Telescope Community Science Meeting, Sedona, AZ, USA, September 2, 2022, *"Electromagnetic signatures of (super)massive black hole binaries"*, (Remote)

5. LISA Symposium XIV, Birmingham, UK, July 25, 2022, *"Observations of massive black holes"*, (Remote)
6. Sloan Digital Sky Survey (SDSS) Collaboration Meeting, Center for Computational Astrophysics/Flatiron Institute, NY, USA, June 23, 2020, *"The Time Domain Spectroscopic Survey: Overview and results"*, (Remote.)
7. American Astronomical Society Meeting, Honolulu, HI, USA, January 5, 2020, *"Panelist; Expertise: Observational Massive Black-hole Binary Signatures"*
8. Young Astronomers on Active Galactic Nuclei, Instituto de Astrofísica de Canarias, Canary Islands, Spain, September 24, 2019, *"Spectroscopic searches for supermassive black hole binaries"*, (Remote.)
9. Quasars in Crisis, The Royal Observatory, Edinburgh, UK, August 9, 2019, *"Spectroscopic searches for supermassive black hole binaries"*
10. The Quest for Multiple Supermassive Black Holes: A Multi-Messenger View, Lorentz Center in Leiden, The Netherlands, November 20, 2017, *"The ongoing observational search for sub-parsec separation supermassive black hole binaries"*
11. Extended Baryonic Acoustic Oscillation Spectroscopic Survey (eBOSS) Collaboration Meeting, The Ohio State University, Columbus, OH, USA, December 4, 2016, *"The Time Domain Spectroscopic Survey: Overview and early results"*
12. Sloan Digital Sky Survey (SDSS) Collaboration Meeting, University of Wisconsin, Madison, WI, USA, June 27, 2015, *"Now you see them, now you don't: the (dis)appearing engines of changing-look quasars"*

Invited Presentations — Departmental colloquia and program-wide seminars

1. Colloquium, University of Utah, Salt Lake City, USA, March 29, 2023, *"TBD"*
2. Seminar, Gravitational Astrophysics Laboratory at NASA Goddard Space Flight Center, Greenbelt, MD, USA, February 23, 2023, *"TBD"*
3. Colloquium, Ball State University, Muncie, IN, USA, February 16, 2023, *"TBD"*
4. Seminar, Cambridge University, Cambridge, UK, April 29, 2021, *"The ongoing hunt for supermassive black hole binaries"*, (Remote.)
5. Colloquium, West Virginia University, Morgantown, WV, USA, January 27, 2021, *"The ongoing hunt for supermassive black hole binaries"*, (Remote.)
6. Theoretical AstroPhysics Including Relativity and Cosmology (TAPIR) Seminar, Caltech, Pasadena, CA, USA, October 9, 2020, *"The ongoing hunt for supermassive black hole binaries"*, (Remote.)
7. Seminar, University of California - Irvine, Irvine, CA, USA, September 29, 2020, *"The ongoing hunt for supermassive black hole binaries"*, (Remote.)

8. Colloquium, Rhodes College, Memphis, TN, USA, February 19, 2020, *"The ongoing hunt for supermassive black hole binaries"*
9. Colloquium, University of Colorado - Boulder, Boulder, CO, USA, November 18, 2019, *"Quasars in the age of time-domain astronomy"*
10. Colloquium, Michigan State University, East Lansing, MI, USA, April 3, 2019, *"The ongoing hunt for supermassive black hole binaries"*
11. Colloquium, Louisiana State University, Baton Rouge, LA, USA, March 7, 2019, *"Quasars in the age of big data and time-domain astronomy"*
12. Colloquium, Michigan Technological University, Houghton, MI, USA, February 14, 2019, *"Quasars in the age of time-domain astronomy"*
13. Colloquium, Vanderbilt University, Nashville, TN, USA, January 24, 2019, *"Quasars in the age of time-domain astronomy"*
14. Colloquium, Space Telescope Science Institute (STScI), Baltimore, MD, USA, January 22, 2019, *"Quasar science with the Hubble Space Telescope in the era of time-domain astronomy"*
15. Colloquium, University of Wyoming, Laramie, WY, USA, October 5, 2018,*"The ongoing hunt for supermassive black hole binaries"*
16. Colloquium, University of Alabama, Tuscaloosa, AL, USA, March 7, 2018,*"The ongoing hunt for supermassive black hole binaries"*
17. Colloquium, The Ohio State University, Columbus, OH, USA, September 29, 2016, *"The observational search for supermassive black hole binaries"*
18. Colloquium, Lafayette College, Easton, PA, USA, April 29, 2016,*"The ongoing hunt for supermassive black hole binaries"*
19. Colloquium, University of the Pacific, Stockton, CA, USA, March 10, 2016, *"Quasars in the age of time-domain astronomy"*
20. Seminar, University of Michigan - Flint, Flint, MI, USA, February 10, 2016,*"Now you see them, now you don't: the (dis)appearing engines of changing-look quasars"*
21. Seminar, University of Pittsburgh, Pittsburgh, PA, USA, November 6, 2015,*"Now you see them, now you don't: the (dis)appearing engines of changing-look quasars"*
22. Colloquium, Lehigh University, Bethlehem, PA, USA, September 3, 2015, *"The ongoing hunt for supermassive black hole binaries"*

Contributed Presentations — Conference talks and posters

1. The Restless Nature of AGN: 10 Years Later, Naples, Italy, June 29, 2023, *"Supermassive black hole binaries and quasar broad emission line variability"*

2. The Astrophysics of Massive Black Hole Mergers: From Galaxy Mergers to the Gravitational Wave Regime, Aspen Center for Physics, Aspen, CO, USA, June 30, 2018, *"Supermassive Black Hole Binaries"*.
3. Compact Objects in Michigan, University of Michigan, Ann Arbor, MI, USA, April 13, 2018, *"Now you see them, now you don't: the (dis)appearing engines of changing-look quasars"*.
4. Using tidal disruption events to study super-massive black holes, Aspen Center for Physics, Aspen, CO, USA, January 26, 2018, *"Changing-Look Quasars"*.
5. Unveiling the Physics Behind Extreme AGN Variability, University of the Virgin Islands, St. Thomas, US Virgin Islands, July 12, 2017, *"The behavior of the broad Mg II line in changing-look quasars"*.
6. AGN Winds on the Georgia Coast, Jekyll Island, GA, USA, June 12, 2017, *"Does the jet in PG1700+518 drive a molecular outflow?",* (poster).
7. Compact Objects in Michigan, Michigan State University, East Lansing, MI, USA, April 13, 2018, *"The ongoing hunt for supermassive black hole binaries"*.
8. Great Lakes Quasar Symposium, University of Western Ontario, London, Ontario, CA, May 3, 2016, *"The ongoing hunt for supermassive black hole binaries",* (poster).
9. Great Lakes Quasar Symposium, University of Western Ontario, London, Ontario, CA, May 3, 2016, *"Now you see them, now you don't: the (dis)appearing engines of changing-look quasars"*.
10. The Physics of Supermassive Black Hole Formation And Feedback, Joint Space-Science Institute, Annapolis, MD, USA, October 12, 2015, *"The ongoing hunt for supermassive black hole binaries",* (poster).
11. TORUS 2015, University of Southampton, Winchester, UK, September 15, 2015, *"Changing-look active galactic nuclei with the Time Domain Spectroscopic Survey (TDSS)"*.
12. Sloan Digital Sky Survey Collaboration Meeting, Instituto de Física Teórica IFT UAM-CSIC, Madrid, Spain, July 21, 2015, *"Changing-look active galactic nuclei with the Time Domain Spectroscopic Survey (TDSS)"*.
13. Physics Neighborhood Meeting, The Pennsylvania State University, State College, PA, USA, March 26, 2015, *"The ongoing hunt for supermassive black hole binaries"*.
14. Unveiling the AGN-Galaxy Evolution Connection, Puerto Varas, Chile, September 15, 2015, *"The ongoing hunt for supermassive black hole binaries",* (poster).
15. Black Holes in Dense Star Clusters, Aspen Center for Physics, Aspen, CO, USA, January 18, 2014, *"The ongoing hunt for supermassive black hole binaries"*.

Contributed Presentations — Conference proceedings with published abstracts

1. M. Kaldor, S. Brown, M. Eracleous, **J. Runnoe**, T. Bogdanovic, and S. Sigurdsson (2023), *"Playing Devil's Advocate with Supermassive Black Hole Binaries"*, American Astronomical Society Meeting Abstracts, 55, 472.01 (pp), https://doi.org/.

2. S. Taylor, M. Charisi, C. Witt, **J. Runnoe**, T. Bogdanovic, and J. Trump (2023), *"Targeted Multi-messenger Searches for Supermassive Black Hole Binaries"*, American Astronomical Society Meeting Abstracts, 55, 435.07 (pp), https://doi.org/.

3. A. Stemo, A. Foord, J. Comerford, R. Barrows, D. Stern, R. Assef, A. Schechter, and J. Runnoe (2023), *"Examining AGN Activation in Mergers in the 1 to 20 kpc Separation Range"*, American Astronomical Society Meeting Abstracts, 55, 360.30 (pp), https://doi.org/.

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