

KEVIN BURDGE

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CURRENT POSITION

Ph.D. Candidate in Physics

Division of Physics, Mathematics, and Astronomy
California Institute of Technology

June 2015 - Present

EDUCATION

California Institute of Technology

Ph.D. in Physics

Division of Physics, Mathematics, and Astronomy

Thesis: Identifying *LISA* Gravitational wave sources using the optical time domain

June 2015 - Present

Massachusetts Institute of Technology

B.S. in Physics

August 2011 - June 2015

RESEARCH INTERESTS

Compact objects (black holes, neutron stars, and white dwarfs) in binary systems, particularly those with orbital periods short enough to emit gravitational waves in the *LISA* frequency band (typically $P_{\text{orbital}} < 30$ minutes).

RESEARCH EXPERIENCE

Caltech Space Radiation Lab

Graduate Research Assistant

January 2017-present

Caltech Quantum Optics Group

Graduate Research Assistant

Summer 2015-December 2016

MIT Laboratory for Nuclear Science

Undergraduate Research Assistant

Summer 2014-Summer 2015

MIT Center for Theoretical Physics

Undergraduate Research Assistant

Spring-Summer 2013

MIT Plasma Science and Fusion Center

Undergraduate Research Assistant

Summer 2012

MIT Center for Theoretical Physics

High School Summer Researcher

Summer 2010

Max Planck Institute for Nuclear Physics Heidelberg

High School Summer Intern

Summer 2009

AWARDED TELESCOPE TIME

- PI of Hubble Space Telescope program awarded 10 orbits
- PI of Gemini-South GMOS program awarded 4 hours of time

- Co-I on program awarded 16 nights of LRIS/ESI time on Keck and 40 nights of time on CHIMERA/DBSP on the Hale telescope at Palomar.

MENTORING/TEACHING EXPERIENCE

- Co-taught advanced placement literature and English language and composition courses in high school, and TA'd advanced placement physics and government courses.
- TA for introductory mechanics, physics lab, and philosophy courses as an undergraduate.
- Have helped mentor three Caltech undergraduate researchers.
- Currently playing an active role in helping mentor a graduate student at Caltech.

OUTREACH

- Have served as a judge and speaker at the Junior Science and Humanities Symposium (JSHS) at the regionals level for six consecutive years. Have also served as a judge twice at the Nationals level. This is a science fair for aspiring high school researchers, which I attended in high school.
- Participated in an outreach program at Caltech to help mentor two high school students conducting summer projects which I helped develop.
- Have attended the Research Science Institute (RSI) as a counselor. This is a summer program held at MIT for high school students who are aspiring researchers, which I attended in high school.

FIRST AUTHOR PUBLICATIONS

References

- [1] Burdge, K. B., Coughlin, M. W., Fuller, J., et al. 2019, *Nature*, **571**, 528, “General relativistic orbital decay in a seven-minute-orbital-period eclipsing binary system”
- [2] Burdge, K. B., Fuller, J., Phinney, E. S., et al. 2019, *The Astrophysical Journal Letters*, **886**, L12, “Orbital Decay in a 20 Minute Orbital Period Detached Binary with a Hydrogen Poor Low Mass White Dwarf”
- [3] Burdge, K. B., Prince, T. A., Fuller, J., et al. 2020, *accepted for publication in the Astrophysical Journal*, “A systematic search of Zwicky Transient Facility data for ultracompact binary LISA-detectable gravitational-wave sources” arXiv:2009.02567
- [4] Burdge, K. B., Coughlin, M. W., Fuller, J., et al. 2020, *awaiting approval from the ZTF publication board to submit to the Astrophysical Journal Letters*, “An 8.8 minute orbital period eclipsing detached double white dwarf binary” arXiv:2010.03555

OTHER PUBLICATIONS

References

- [1] Coughlin, M. W., Burdge, K., Duev, D. A., et al. 2020, *accepted for publication in Monthly Notices of the Royal Astronomical Society* “The ZTF Source Classification Project: II. Periodicity and variability processing metrics” arXiv:2009.14071
- [2] Claret, A., Cukanovaite, E., Burdge, K., et al. 2020, *Astronomy & Astrophysics*, **641**, A157 “Doppler beaming factors for white dwarfs, main sequence stars, and giant stars. Limb-darkening coefficients for 3D (DA and DB) white dwarf models”

- [3] Kupfer, T., Bauer, E. B., Burdge, K. B., et al. 2020, *The Astrophysical Journal Letters*, **898**, L25 “A New Class of Roche Lobe-filling Hot Subdwarf Binaries”
- [4] Coughlin, M. W., Burdge, K., Phinney, E. S., et al. 2020, *Monthly Notices of the Royal Astronomical Society*, **494**, L91 “ZTF J1901+5309: a 40.6-min orbital period eclipsing double white dwarf system”
- [5] Kupfer, T., Bauer, E. B., Marsh, T. R., Burdge, K. B., et al. 2020, *The Astrophysical Journal*, **891**, 45 “The First Ultracompact Roche Lobe-Filling Hot Subdwarf Binary”
- [6] Claret, A., Cukanovaite, E., Burdge, K., et al. 2020, *Astronomy & Astrophysics*, **634**, A93 “Gravity and limb-darkening coefficients for compact stars: DA, DB, and DBA eclipsing white dwarfs”
- [7] Kupfer, T., Bauer, E. B., Burdge, K. B., et al. 2019, *The Astrophysical Journal Letters*, **878**, L35, “A New Class of Large-amplitude Radial-mode Hot Subdwarf Pulsators”
- [8] Margon, B., Kupfer, T., Burdge, K., et al. 2018, *The Astrophysical Journal Letters*, **856**, L2, “The Binary Dwarf Carbon Star SDSS J125017.90+252427.6”
- [9] Coughlin, M. W., Dekany, R. G., Duev, D. A., et al. 2019, *Monthly Notices of the Royal Astronomical Society*, **485**, 1412, “The Kitt Peak Electron Multiplying CCD demonstrator”
- [10] Bolin, B. T., Fremling, C., Holt, T. R., et al. 2020, *The Astrophysical Journal Letters*, **900**, L45 “Characterization of Temporarily Captured Minimoons 2020 CD3 by Keck Time-resolved Spectrophotometry”
- [11] Soumagnac, M. T., Ofek, E. O., Liang, J., et al. 2020, *The Astrophysical Journal*, **899**, 51 “Early Ultraviolet Observations of Type II_n Supernovae Constrain the Asphericity of Their Circumstellar Material”
- [12] Bolin, B. T., Lisse, C. M., Kasliwal, M. M., et al. 2020, *The Astrophysical Journal*, **160**, 26 “Characterization of the Nucleus, Morphology, and Activity of Interstellar Comet 2I/Borisov by Optical and Near-infrared GROWTH, Apache Point, IRTF, ZTF, and Keck Observations”
- [13] Graham, M. J., Ford, K. E. S., McKernan, B., et al. 2020, *Physical Review Letters*, **124**, 251102 “Candidate Electromagnetic Counterpart to the Binary Black Hole Merger Gravitational-Wave Event S190521g*”
- [14] Ho, A. Y. Q., Perley, D. A., Kulkarni, S. R., et al. 2020, *The Astrophysical Journal*, **895**, 49 “The Koala: A Fast Blue Optical Transient with Luminous Radio Emission from a Starburst Dwarf Galaxy at $z = 0.27$ ”
- [15] Szkody, P., Diczynski, B., Ho, A. Y. Q., et al. 2020, *The Astronomical Journal*, **159**, 198 “Cataclysmic Variables in the First Year of the Zwicky Transient Facility”
- [16] Wang, Z., Xing, Y., Zhang, J., et al. 2020, *Monthly Notices of the Royal Astronomical Society*, **493**, 4845 “A compact X-ray emitting binary in likely association with 4FGL J0935.3+0901”
- [17] De, K., Hankins, M. J., Kasliwal, M. M., et al. 2020, *Publications of the Astronomical Society of the Pacific*, **132**, 025001 “Palomar Gattini-IR: Survey Overview, Data Processing System, On-sky Performance and First Results”
- [18] Masci, F. J., Laher, R. R., Rusholme, B., et al. 2019, *Publications of the Astronomical Society of the Pacific*, **131**, 018003, “The Zwicky Transient Facility: Data Processing, Products, and Archive”
- [19] Mahabal, A., Rebbapragada, U., Walters, R., et al. 2019, *Publications of the Astronomical Society of the Pacific*, **131**, 038002, “Machine Learning for the Zwicky Transient Facility”
- [20] van Roestel, J., Kupfer, T., Ruiz-Carmona, R., et al. 2018, *Monthly Notices of the Royal Astronomical Society*, **475**, 2560, “Discovery of 36 eclipsing EL CVn binaries found by the Palomar Transient Factory”

- [21] Battat, J. B. R., Irastorza, I. G., Aleksandrov, A., et al. 2016, *Physical Reports*, **662**, 1, “Readout technologies for directional WIMP Dark Matter detection”
- [22] Coughlin, M. W., Ahumada, T., Anand, S., et al. 2019, *accepted for publication in the Astrophysical Journal Letters*, “GROWTH on S190425z: Searching thousands of square degrees to identify an optical or infrared counterpart to a binary neutron star merger with the Zwicky Transient Facility and Palomar Gattini IR”
- [23] De, K., Kasliwal, M. M., Polin, A., et al. 2019, *The Astrophysical Journal Letters*, **873**, L18, “ZTF 18aaqasu (SN2018byg): A Massive Helium-shell Double Detonation on a Sub-Chandrasekhar-mass White Dwarf”
- [24] Yan, L., Wang, T., Jiang, N., et al. 2019, *The Astrophysical Journal*, **874**, 44, “Rapid Turn-on of Type-1 AGN in a Quiescent Early-type Galaxy SDSS1115+0544”