

# Alexander J. Dittmann

University of Maryland  
Department of Astronomy  
1235 Atlantic Building  
College Park MD 20742

Email: [dittmann@astro.umd.edu](mailto:dittmann@astro.umd.edu)  
ORCID: [0000-0001-6157-6722](https://orcid.org/0000-0001-6157-6722)  
Homepage: <https://ajdittmann.github.io/>  
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## EDUCATION

2018-present	Graduate study in Astronomy, University of Maryland
2018-2020	M.S. in Astronomy, University of Maryland
2014-2018	B.S. <i>with Highest Distinction</i> in Physics, University of Illinois
2014-2018	B.S. <i>with High Distinction</i> in Astronomy, University of Illinois

## RESEARCH EXPERIENCE

2022-present	Research Assistant, Los Alamos National Lab, Theoretical Division	astrophysics
2020, Fall	Pre-doctoral Research Assistant, Flatiron CCA	astrophysics
2018-present	Graduate Research Assistant, University of Maryland	astrophysics
2016-2018	Research Assistant, University of Illinois	astrophysics
2016, Summer	SULI Research Assistant, General Atomics	plasma physics
2014-2015	Summer Research Assistant, Catholic University of America	nuclear physics

## FELLOWSHIPS AND AWARDS

2022	Bruno Rossi Prize, co-awardee as a member of the NICER team American Astronomical Society, High Energy Astrophysics Division
2021	Outstanding Research Assistant University of Maryland Graduate School
2020	CCA Pre-Doctoral Fellowship Flatiron Institute Center for Computational Astrophysics, Fall 2020
2018	Graduate School Dean's Fellowship University of Maryland, Fall 2018 - Summer 2019
2018	Wyatt Award - graduating Astronomy major with most outstanding GPA and research University of Illinois, Department of Astronomy, Spring 2018

## PUBLICATIONS

## Submitted

- 2023 The Influence of Disk Composition on the Evolution of Stars in the Disks of Active Galactic Nuclei  
**Dittmann, A. J.**, Jermyn, A. S., Cantiello, M., accepted, ApJ

## Journal Articles

Summary: 20 published, 8 first-author, 4 single-author

- 2022 The Radius of PSR J0740+6620 from NICER with NICER Background Estimates  
 Salmi, T., **et al.**, ApJ 941, 450
- 2022 A Survey of Disc Thickness and Viscosity in Circumbinary Accretion:  
 Binary Evolution, Variability, and Disc Morphology  
**Dittmann, A. J.**, Ryan, G., MNRAS 513, 6158
- 2022 Effects of an Immortal Stellar Population in AGN Disks  
 Jermyn, A. S., **et al.**, ApJ 929, 133
- 2022 An Analytical, Fully Relativistic Framework for Tidal Disruption Event Streams  
 in Schwarzschild Geometry  
**Dittmann, A. J.**, MNRAS 511, 3408
- 2021 On the Terminal Spins of Accreting Stars and Planets: Boundary Layers  
**Dittmann, A. J.**, MNRAS 508, 1842
- 2021 Preventing Anomalous Torques in Circumbinary Accretion Simulations  
**Dittmann, A. J.**, Ryan, G., ApJ 921, 71
- 2021 The Radius of PSR J0740+6620 from NICER and XMM-Newton Data  
 Miller, M. C., Lamb, F. K., **Dittmann, A. J.**, et al., ApJL 918, L28
- 2021 NICER Detection of Thermal X-Ray Pulsations from the Massive Millisecond Pulsars  
 PSR J0740+6620 and PSR J1614–2230  
 Wolff, M., **et al.**, ApJL 918, L26
- 2021 Accretion onto Stars in the Disks of Active Galactic Nuclei  
**Dittmann, A. J.**, Cantiello, M., Jermyn, A. S. , ApJ 916, 48
- 2021 Stellar Evolution in the Disks of Active Galactic Nuclei Produces Rapidly Rotating Massive Stars  
 Jermyn, A. S., **Dittmann, A. J.**, Cantiello, M., Perna, R., ApJ 914, 105
- 2021 Constraining the Neutron Star Mass-Radius Relation and Dense Matter Equation of State  
 with NICER. III. Model and Systematics  
 Bogdanov **et al.**, ApJL 914, L15
- 2021 High-Order Multiderivative IMEX Schemes  
**Dittmann, A. J.** Applied Numerical Mathematics 160, 205
- 2020 Modified Hermite Integrators of Arbitrary Order  
**Dittmann, A. J.**, MNRAS 496, 1217
- 2020 Star Formation in Accretion Disks and SMBH Growth  
**Dittmann, A. J.**, Miller, M. C., MNRAS 493, 3732
- 2019 PSR J0030+0451 Mass and Radius from NICER Data and Implications for the Properties of  
 Neutron Star Matter  
 Miller, M. C., Lamb, F. K., **Dittmann, A. J.**, et al., ApJL 887, L24

- 2019 Constraining the Neutron Star Mass-Radius Relation and Dense Matter Equation of State with NICER. II. Emission from Hot Spots on a Rapidly Rotating Neutron Star  
Bogdanov S., **et al.**, ApJL 887, L26
- 2018 A Candidate Tidal Disruption Event in a Quasar at  $z = 2.359$  from Abundance Ratio Variability  
Liu, X., **Dittmann, A. J.**, Shen, Y., Jiang, L., ApJ 859, 8
- 2018 Separated kaon electroproduction cross section and the kaon form factor from 6 GeV JLab data  
Carmignotto, M., **et al.**, PhysRevC 97, 025204
- 2017 The Aerogel Čerenkov detector for the SHMS magnetic spectrometer in Hall C at Jefferson Lab  
Horn, T., **et al.**, NIMA 842, 28
- 2015 PSR J1930–1852: A Pulsar in the Widest Known Orbit Around Another Neutron Star  
Swiggum, J. K. **et al.**, ApJ 805, 156

## SEMINARS, COLLOQUIA, AND SYMPOSIA

- 2022 The Evolution of Stars and Black Holes in AGN disks,  
Astrophysics Seminar (GMU), November 3
- 2022 The Evolution of Stars and Black Holes in AGN disks, Physics Colloquium (GWU), October 20
- 2022 The Evolution of Stars and Black Holes in AGN disks,  
Transient Astronomy Meeting (UMD), September 2
- 2022 The Evolution of Stars and Black Holes in AGN disks,  
Los Alamos Astrophysics Seminar (LANL), August 25
- 2022 The Orbital Evolution and Appearance of Binaries Fed by Circumbinary Disks,  
Gravitational Astrophysics Laboratory lunch seminar (GSFC), February 24
- 2021 Neutron Star Masses and Radii from NICER Data,  
JSI Minisymposium on Neutron Stars and Dense Matter (UMD), December 10
- 2021 The Orbital Evolution and Appearance of Binaries Fed by Circumbinary Disks,  
Center for Theory and Computation Seminar (UMD), November 10
- 2021 Measuring the Heaviest Known Neutron Star: the Radius of PSR J0740 from X-ray  
Data, Compact Objects Group Meeting (CCA), April 22
- 2021 Circumbinary Disks, sink particles, and making simulations less sensitive to tuning  
parameters, Hernquist Group Meeting (CfA), March 5
- 2021 Stellar Evolution in AGN Disks, Flatiron/CCA Predoc Symposium, February 26
- 2021 Circumbinary Disks, sink particles, and making simulations less sensitive to tuning  
parameters, Compact Objects Group Meeting (CCA), January 28
- 2020 Stars in AGN disks, CCA lunch talk, October 1

## CONFERENCES AND WORKSHOPS

- 2022 Promoting BIPOC and Marginalized Students to Pursue Computational Physics  
through CRANE, contributed talk by Ernesto Barraza-Valdez, **et al.**, APS DPP, October 17
- 2018 A Time-domain Analysis of Nitrogen-Rich Quasars,  
poster, Winter AAS, January 10
- 2016 Ray-tracing studies of fast waves in the lower hybrid range of frequencies,  
poster, APS DPP, November 1
- 2015 Exploring the potential for studies of the electromagnetic structure of the kaon  
at 12 GeV JLab, contributed talk, APS DNP, October 31
- 2014 The Optical Characterization of Aerogel Tiles for Cherenkov Detectors at Jefferson Lab,  
poster, APS DNP, October 10

## TEACHING EXPERIENCE

### University of Maryland

2020 - spring	Theoretical Astrophysics	wrote and taught discussions, graded
2020 - spring	Black Holes	graded, helped update lecture material
2019 - fall	General Astronomy	presented 3 lectures, taught discussions and labs, graded
2019 - spring	General Astronomy	taught and graded discussions and labs
2018 - fall	General Astronomy	taught and graded discussions and labs

## COMPUTING

Languages	C, Python, Fortran, CUDA, IDL
Tools	git, SLURM

## SERVICE AND OUTREACH

### Journals

Referee	MNRAS, ApJ
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### GRAD-MAP<sup>1</sup>

Winter Workshop mentoring	N-body simulations of stellar binaries and SMBHs (2020), the perturbed circular restricted 3-body problem (2022)
Winter Workshop Python Bootcamp	Co-lead (2022), lecture teaching/planning (2020, 2021)
Summer Scholars mentoring	Hydrodynamic simulations of tidal disruption event streams
Summer Scholars teaching	Lectured on visualizing multidimensional data using Python and an introduction to programming in C

### CRANE<sup>2</sup>

Notebook co-author	Runge-Kutta methods, PDEs
Lecturer	hyperbolic PDEs, the Boris push algorithm
Teaching assistant	Numerical integration, ODEs, PDEs, PIC Methods

### Undergraduate Curriculum

Introductory labs	revised, restructured, and tested new labs
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<sup>1</sup>Graduate Resources Advancing Diversity with Maryland Astronomy and Physics, <https://www.umdgradmap.org/>

<sup>2</sup>Computational Research Access NETwork, <https://www.cranephysics.org/>