Thomas Wagg

PhD Student in Astrophysics at the University of Washington

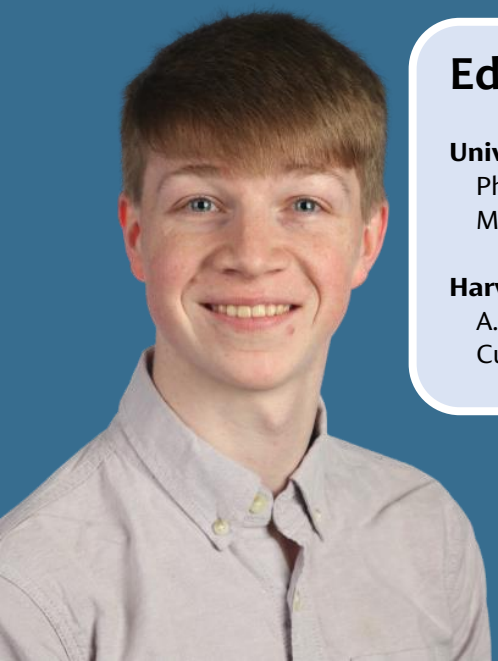
Academic Interests

I am broadly interested in the interplay between binary stellar evolution and the kinematics of stars and compact objects. I'm also passionate about designing and using open-source software. My thesis combines these joint interests in developing, and applying, self-consistent population synthesis and galactic dynamics simulations.

I've previously made predictions regarding the impact of LSST on near-Earth object follow-up and designed an algorithm to better characterise potential NEOs. Additionally, I am interested in Galactic gravitational wave sources & LISA and developed LEGWORK, a Python package for making predictions about these objects.

Awards and Fellowships

CCA Pre-Doctoral Fellowship for a self-proposed project at the Flatiron Institute (Simons Foundation)	2023
Kavli Summer Fellowship for a project on asteroseismic imprints of mass transfer (Kavli Foundation)	2023
Graduate Research Prize for an exceptional research project (University of Washington)	2022
Provost Scholar Fellowship ($15k) for outstanding academic achievement (University of Washington)	2021
Alex G. Booth Fellowship (~$5k) awarded to recent graduates for a research project (Harvard)	2020
Leo Goldberg Prize for the best astronomy senior thesis (Harvard)	2020
Bloomberg creative science prize for most insightful senior thesis in the natural sciences (Harvard)	2020
Distinction in Teaching awarded for excellence in teaching (Harvard)	2019
Haase Fellowship (~$5k) awarded for summer research project in Physics (Harvard)	2018



Education

University of Washington 2021 – present
Ph.D. in Astrophysics (Advisor: Eric Agol)
M.S. in Astrophysics (March 2023)

Harvard University 2016 – 2020
A.B. in Physics and Astrophysics, Secondary in Computer Science
Cum laude with Highest Honors in Field

tomwagg@uw.edu
tomwagg.com
github.com/TomWagg
+1 857-253-9571
Physics-Astronomy Bldg, Room C319,
Box 351580, Seattle, WA 98195-1700

Selected Publications

Full ADS search results

First-author

1. **Wagg, T.**, Broekgaarden, F.S., de Mink, S.E., et al., *Gravitational wave sources in our Galactic backyard: Predictions for BHBH, BHNS and NSNS binaries detectable with LISA*, ApJ, 937, 118
2. **Wagg, T.**, Breivik, K., de Mink, S.E., *LEGWORK: A python package for computing the evolution and detectability of stellar-origin gravitational-wave sources with space-based detectors,* ApJS, 260, 52, JOSS
3. **Wagg. T,** Juric, M., Yoachim, P., et al., *Too much of a good thing? Rapid NEO Follow-up Strategies in the Era of LSST,* [under review]
4. **Wagg. T,** Johnston, C., Bellinger E., et al., *The Asteroseismic Imprints of Mass Transfer,* [in prep]

Co-author

5. Broekgaarden, F.S., et al. (incl. **Wagg, T.**), *Impact of Massive Binary Star and Cosmic Evolution on Gravitational Wave Observations II: Double Compact Object Rates and Properties*, MNRAS, 516, 4
6. van Son, L.A.C., et al. (incl. **Wagg, T.**), *The redshift evolution of the binary black hole merger rate: a weighty matter,* ApJ 931, 1
7. Team COMPAS, Riley, J., et al. (incl. **Wagg, T.**) *Rapid stellar and binary population synthesis with COMPAS,* ApJS 258 2 & JOSS
8. Hellier, C., et al. (incl. **Wagg, T.**) *WASP-South transiting exoplanets: WASP-130b, WASP-131b, WASP-132b, WASP-139b, WASP-140b, WASP-141b and WASP-142b,* MNRAS 465 3
9. Maxted, P. F. L., et al. (incl. **Wagg, T.**) Five transiting hot Jupiters discovered using WASP-South, Euler, and TRAPPIST: WASP-119 b, WASP-124 b, WASP-126 b, WASP-129 b, and WASP-133 b, A&A 591 A55

Talks

Invited Seminars

UWB Gravitational Wave Astronomy Group – *Stellar-origin GW sources in LISA*	Jan 2022
LISA Early Career Scientist Software Series – *LEGWORK python package*	Jan 2022
LISA Community Telecon – *Stellar-origin GW sources in LISA*	Dec 2021
SESTAS Seminar at Max Planck Institute, Garching – *Stellar-origin GW sources in LISA*	Nov 2021
TianQin Research Center for Gravitational Physics – *LEGWORK python package*	Nov 2021
CCA Gravitational Wave Group – *Stellar-origin GW sources in LISA*	May 2021

Contributed Talks

AAS 241 – *NEO Follow-up in the era of LSST*	Jan 2023
LSST@Europe4 – *A hybrid solar system object catalogue*	Oct 2022
14th LISA Symposium – *Stellar-origin gravitational wave source in LISA*	July 2022
EAS 2021 – *Stellar-origin gravitational wave source in LISA*	May 2021
13th LISA Symposium – *Black hole-Neutron Star binaries in LISA*	Sep 2020

tomwagg@uw.edu tomwagg.com github.com/TomWagg +1 857-253-9571

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Teaching & Mentoring Experience

CS50: Introduction to Computer Science, *Harvard* — 2018
Class introducing computer science to undergraduates through C, Python and JavaScript with David Malan. Taught weekly sections & held office hours

CS61: Systems Programming and Machine Organization, *Harvard* — 2019
Course for computer science majors teaching the fundamentals of systems programming with C with Eddie Kohler. Taught weekly sections & held office hours

ASTR 150A: The Planets, *University of Washington* — 2021
General education course on various topics related to the solar system and its planets. Taught 3 weekly sections, held office hours and designed exam mark scheme with Toby Smith

ASTR 150E: The Planets, *University of Washington* — 2022
Online general education course on various topics related to the solar system and its planets. Led weekly discussions, held office hours and designed final exam with Nicole Kelly

Pre-MAP Project: A search for self-lensing binaries in TESS, *University of Washington* — 2022
Mentored Emma Bacarra, Miguel Varanda & Elizabeth Pawelka (undergraduates at UW) in a research project searching through TESS data for a microlensing signal from a BH-star binary

Service and Outreach

UW Graduate Student Representative — 2022–24
As the elected graduate student representative in the department, I have worked to improve the department community and culture, in particular regarding graduate student activities.

- Organised weekly faculty-grad lunches for graduates to interact with faculty in a casual manner and form stronger intra-departmental connections
- Helped to implement guidelines and safeguards for expectations regarding TA work to address issues of inequity across different classes
- Enacted improvements to department mentoring framework including creating a Mentoring Week each quarter
- Represented graduate students on assistant professor hiring committee

eSTEAM: UW Prison Outreach Program — 2022–
Designed, built and continuously maintain website for the eSTEAM prison outreach program

Astronomy on Tap Presenter — 2022–
Presented talks on gravitational waves and near-Earth objects to the general public

UW Planetarium Presenter — 2021–
Perform weekly planetarium shows for local schools, homeschool groups and senior citizens on the solar system and the Milky Way using WorldWideTelescope in the UW planetarium

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