Kaze W. K. Wong

Assistant Research Professor · Research Software Engineer

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I work on diverse topics centered around developing **production-grade, machine learning-enhanced software for real-world challenges** that currently limit scientific progress. My research spans data-driven astrophysics, Bayesian inference, high-performance ML-enhanced simulations, robust machine learning, digital twins, medical imaging, and large-scale deep learning. I prioritize **code performance, usability, and robustness** while strongly advocating for **open-source software** and reproducible research.

Experience

Assistant Research Professor — Johns Hopkins University, Baltimore
Department of Applied Mathematics and Statistics — 2024 August - Present

Research Software Engineer — Johns Hopkins University, Baltimore
Data Science and AI Institute — 2024 August - Present

Flatiron Research Fellow — Flatiron Institute, New York
Center for Computational Astrophysics — 2021 August - 2024 August

Education

Johns Hopkins University — Baltimore, Maryland
Ph.D. in Physics and Astronomy — August 2017 - August 2021

The Chinese University of Hong Kong — Hong Kong
B.Sc. in Physics — August 2013 - August 2017

Honors and Awards

GWIC-Braccini Thesis Prize 2021

HPC-Europa 3 Transnational Access Programme Awardee 2020

HKSAR Reaching Out Award 2015

New Asia Collage Student Study Trip Scholarship 2015

C.N. Yang Scholarship 2014

Service

Organizer of JHU AMS datathon 2024

Organizer of Jaxtronomy workshop 2024

Lecturer of Carl-Zeiss-Stiftung summer school 2023

FWAM organization committee 2022 and 2023

Organizer of Flatiron Machine Learning Conference 2023

Guest lecturer at Hunter College 2023

Organizer of Flatiron machine learning journal club 2021-2024

Referee for MNRAS, ApJ, Nature Astronomy, JOSS, Neurips physics workshop, ICML astronomy workshop, PRD, and PRL

Project mentor of Pre-docs at CCA
Rachel Zhang

Project mentor of PhD students, including
Wilson Gregory, Ronan Legin, Jiadong Li, David Ruhe

Project mentor of undergraduate students for summer project, including
Alexander Verhaeghe, Tony Luo, Ben Y. O. Xu, Charmaine S. M. Wong, Damon H. T. Cheung, Kelvin K. H. Lam, Thomas C. K. Ng, Joseph Gais

Highlighted Publications

Fast gravitational wave parameter estimation without compromises
Kaze W.K. Wong, Maximiliano Isi, Thomas D.P. Edwards 2023

flowMC: Normalizing flow enhanced sampling package for probabilistic inference in JAX
Kaze W.K. Wong, Marylou Gabrié, Daniel Foreman-Mackey 2023

Backward Population Synthesis: Mapping the Evolutionary History of Gravitational-Wave Progenitors
Kaze W.K. Wong, Katelyn Breivik, Will M. Farr, Rodrigo Luger 2022

Publication list

Peering into the black box: forward-modeling the uncertainty budget of high-resolution spectroscopy of exoplanet atmospheres
Arjun B. Savel, Megan Bedell, Eliza M. -R. Kempton, Peter Smith, Jacob L. Bean, Lily L. Zhao, **Kaze W. K. Wong**, Jorge A. Sanchez, Michael R. Line 2024

Robust Emulator for Compressible Navier-Stokes using Equivariant Geometric Convolutions
Wilson G. Gregory, David W Hogg, **Kaze W. K. Wong**, Soledad Villar 2024

Super-Resolution without High-Resolution Labels for Black Hole Simulations
Thomas Helfer, Thomas D.P. Edwards, Jessica Dafflon, **Kaze W.K. Wong**, Matthew Lyle Olson 2024

Accelerated Bayesian parameter estimation and model selection for gravitational waves with normalizing flows
Alicja Polanska, Thibeau Wouters, Peter T.H. Pang, **Kaze W.K. Wong**, Jason D. McEwen 2024

Gravitational Wave Parameter Estimation in non-Gaussian noise using Score-Based Likelihood Characterization
Ronan Legin, Maximiliano Isi, **Kaze W.K. Wong**, Alexandre Adam, Laurence Perreault-Levasseur, Yashar Hezaveh 2024

Birefringence tests of gravity with multimessenger binaries
Macarena Lagos, Leah Jenks, Maximiliano Isi, Kenta Hotokezaka, Brian D. Metzger, **Kaze W.K. Wong**, et al. 2024

AspGap: Augmented Stellar Parameters and Abundances for 23 million RGB stars from Gaia XP low-resolution spectra
Jiadong Li, **Kaze W.K. Wong**, David W. Hogg, Hans-Walter Rix, Vedant Chandra 2023

Towards Unbiased Gravitational-Wave Parameter Estimation using Score-Based Likelihood Characterization
Ronan Legin, Maximiliano Isi, **Kaze W.K. Wong**, Alexandre Adam, Laurence Perreault-Levasseur, Yashar Hezaveh 2023

Recalibrating Gravitational Wave Phenomenological Waveform Model
Kelvin K.H. Lam, **Kaze W.K. Wong**, Thomas D.P. Edwards 2023

GeometricImageNet: Extending convolutional neural networks to vector and tensor images
Wilson Gregory, David W. Hogg, Ben Blum-Smith, Maria Teresa Arias, **Kaze W.K. Wong**, Soledad Villar 2023

Constraining gravitational wave amplitude birefringence with GWTC-3
Thomas C.K. Ng, Maximiliano Isi, **Kaze W.K. Wong**, Will M. Farr 2023

ripple: Differentiable and Hardware-Accelerated Waveforms for Gravitational Wave Data Analysis
Thomas D.P. Edwards, **Kaze W.K. Wong**, Kelvin K.H. Lam, Adam Coogan, Daniel Foreman-Mackey, Maximiliano Isi 2023

Normalizing Flows for Hierarchical Bayesian Analysis: A Gravitational Wave Population Study
David Ruhe, **Kaze Wong**, Miles Cranmer, Patrick Forré 2022

A Sun-like star orbiting a black hole
Kareem El-Badry, Hans-Walter Rix, Eliot Quataert, Andrew W. Howard, Howard Isaacson, Keith Hawkins, Katelyn Breivik, **Kaze W.K. Wong**, Antonio C. Rodriguez, Sahar Shahaf, Tsevi Mazeh, Frédéric Arenou, Kevin B. Burdge, Dolev Bashi, Daniel R. Weisz, Rhys Seeburger, Silvia Almada Monter, Jennifer Wojno 2022

Nonlinear effects in black hole ringdown
Mark Ho-Yeuk Cheung, Vishal Baibhav, Emanuele Berti, Vitor Cardoso, Gregorio Carullo, Roberto Cotesta, Walter Del Pozzo, Francisco Duque, Thomas Helfer, Estuti Shukla, **Kaze W.K. Wong** 2022

Automated discovery of interpretable gravitational-wave population models

Kaze W.K. Wong, Miles Cranmer 2022

Inferring the Intermediate Mass Black Hole Number Density from Gravitational Wave Lensing Statistics

Joseph Gais, Ken Ng, Eungwang Seo, **Kaze W.K. Wong**, Tjonnie G.F. Li 2022

The CAMELS project: public data release

Francisco Villaescusa-Navarro, Shy Genel, Daniel Anglés-Alcázar, Lucia A. Perez, Pablo Villanueva-Domingo, et al. (Include **Kaze W.K. Wong**) 2022

Searching for a subpopulation of primordial black holes in LIGO-Virgo gravitational-wave data

Gabriele Franciolini, Vishal Baibhav, Valerio De Luca, Ken K.Y. Ng, **Kaze W.K. Wong**, et al. 2022

Testing the robustness of simulation-based gravitational-wave population inference

Damon H.T. Cheung, **Kaze W.K. Wong**, Otto A. Hannuksela, Tjonnie G.F. Li 2021

The CAMELS Multifield Data Set: Learning the Universe's Fundamental Parameters with Artificial Intelligence

Francisco Villaescusa-Navarro, Shy Genel, Daniel Angles-Alcázar, Leander Thiele, Romeel Dave, et al. (Include **Kaze W.K. Wong**) 2021

Hunting intermediate-mass black holes with LISA binary radial velocity measurements

Vladimir Strokov, Giacomo Fragione, **Kaze W.K. Wong**, Thomas Helfer, Emanuele Berti 2021

Building new tools for gravitational wave astronomy

Wang Kei Wong 2021

Discriminating between different scenarios for the formation and evolution of massive black holes with LISA

Alexandre Toubiana, **Kaze W.K. Wong**, Stanislav Babak, Enrico Barausse, Emanuele Berti 2021

Looking for the parents of LIGO's black holes

Vishal Baibhav, Emanuele Berti, Davide Gerosa, Matthew Mould, **Kaze W.K. Wong** 2021

The missing link in gravitational-wave astronomy: A summary of discoveries waiting in the decihertz range

Manuel Arca Sedda, Christopher P.L. Berry, Karan Jani, Pau Amaro-Seoane, Pierre Auclair, et al. (Includes **Kaze W.K. Wong**) 2021

GRChombo: An adaptable numerical relativity code for fundamental physics

Tomas Andrade, Llibert Areste Salo, Josu C. Aurrekoetxea, Jamie Bamber, Katy Clough, et al.(Includes **Kaze W.K. Wong**) 2021

Joint constraints on the field-cluster mixing fraction, common envelope efficiency, and globular cluster radii from a population of binary hole mergers via deep learning

Kaze W.K. Wong, Katelyn Breivik, Kyle Kremer, Thomas Callister 2021

Constraining the primordial black hole scenario with Bayesian inference and machine learning: the GWTC-2 gravitational wave catalog

Kaze W.K. Wong, Gabriele Franciolini, Valerio De Luca, Emanuele Berti 2021

Gravitational-wave signal-to-noise interpolation via neural networks

Kaze W.K. Wong, Ken K.Y. Ng, Emanuele Berti 2020

Distinguishing double neutron star from neutron star-black hole binary populations with gravitational wave observations

Margherita Fasano, **Kaze W.K. Wong**, Andrea Maselli, Emanuele Berti, Valeria Ferrari et al. 2020

The mass gap, the spin gap, and the origin of merging binary black holes

Vishal Baibhav, Davide Gerosa, Emanuele Berti, **Kaze W.K. Wong**, Thomas Helfer 2020

Gravitational wave population inference with deep flow-based generative network

Kaze W.K. Wong, Gabriella Contardo, Shirley Ho 2020

The missing link in gravitational-wave astronomy: discoveries waiting in the decihertz range

Manuel Arca Sedda, Christopher P.L. Berry, Karan Jani, Pau Amaro-Seoane, Pierre Auclair, et al. (Includes **Kaze W.K. Wong**) 2020

Unveiling the gravitational universe at mu-Hz frequencies

Alberto Sesana, Natalia Korsakova, Manuel Arca Sedda, Vishal Baibhav, Enrico Barausse, et al. (Includes **Kaze W.K. Wong**) 2020

Machine-learning interpolation of population-synthesis simulations to interpret gravitational-wave observations: a case study

Kaze W.K. Wong, Davide Gerosa 2019

What we can learn from multi-band observations of black hole binaries

Curt Cutler, Ely D. Kovetz, Emanuele Berti, Karan Jani, Lisa Randall, et al. (Includes **Kaze W.K. Wong**) 2019

Binary radial velocity measurements with space-based gravitational-wave detectors

Kaze W.K. Wong, Vishal Baibhav, Emanuele Berti 2019

Multiband gravitational-wave event rates and stellar physics

Davide Gerosa, Sizheng Ma, **Kaze W.K. Wong**, Emanuele Berti, Richard O'Shaughnessy et al. 2019

On the possibility of detecting ultrashort period exoplanets with LISA

Kaze W.K. Wong, Emanuele Berti, William E. Gabella, Kelly Holley-Bockelmann 2019

Probing the existence of ultralight bosons with a single gravitational-wave measurement

Otto A. Hannuksela, **Kaze W.K. Wong**, Richard Brito, Emanuele Berti, Tjonnie G.F. Li 2019

Expanding the LISA Horizon from the Ground

Kaze W.K. Wong, Ely D. Kovetz, Curt Cutler, Emanuele Berti 2018

Precise LIGO Lensing Rate Predictions for Binary Black Holes

Ken K.Y. Ng, **Kaze W.K. Wong**, Tom Broadhurst, Tjonnie G.F. Li 2018

Filtering interlopers from galaxy surveys

Kaze W.K. Wong, Anthony Pullen, Shirley Ho 2018