

# Hao-Jui Kuan

## Curriculum Vitae

### Personal information

Date of birth 13 July 1995  
Nationality Taiwan  
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### Education

2019 - 2022 **PhD in Theoretical Astrophysics with “summa cum laude” (excellent)**  
University of Tübingen, Tübingen, Germany. *Advisor: Kostas D. Kokkotas*  
2017 - 2022 **PhD in Physics (joint degree)**  
National Tsing Hua University, Hsinchu, Taiwan. *Advisor: Chao-Qiang Geng*  
2013 - 2017 **B.Sc Double major in Physics and Mathematics**

### Professional experience

2023 - Postdoc in the Computational Relativistic Astrophysics division at the Max Planck Institute for Gravitational Physics (Albert Einstein Institute)

### Awards, Honors, Fellowships & Grants

#### Grants

2020 - 2021 Principal Investigator of Sandwich-Scholarship Programme;  
13,500 euro, funded by Deutscher Akademischer Austauschdienst (DAAD), and Ministry of Science and Technology, Taiwan (MOST) with funding ID being JYP 109-2927-I-007-503.

#### Awards/Honors

2023 Honorable Mention in GWIC-Braccini Thesis Prize ([website](#))  
2023 Dr. Friedrich Förster Prize from University of Tübingen  
2023 Student Outstanding Paper Award from NCTS, Taiwan

#### Scholarship

2017 - 2020 Presidential Scholarship of National Tsing Hua University, Taiwan

### Scientific summary

Plenary conference talk	...	1
Invited seminar	...	9
Conference talk/poster	...	10
Number of first author articles	...	11
Refereed Articles	...	17
Preprints/journal submissions	...	3
h index (HEP-SPIRES)	...	10

### Reviewing Activities

Reviewer for Journals: Physical Review D, International Journal of Modern Physics D, Monthly Notices of the Royal Astronomical Society, European Physical Journal C

## Full Presentations/Seminar List

### 2024

- Oct 9      **"On the finite-size imprints on waveforms of binary neutron star mergers"**, talk, Observatoire de Paris - site de Meudon, France.
- Aug 1      **"On the finite-size imprints on waveforms of binary neutron star mergers"**, invited seminar, UIUC.
- July 11     **"Imprints of matter and scalar effects on waveforms from binary neutron star mergers"**, invited seminar, online-seminar-in-mathematical-numerical-relativity ([website](#)).
- April 24    **"Imprints of matter and scalar effects on waveforms from binary neutron star mergers"**, invited seminar, Institute for Gravitational and Subatomic Physics (GRASP), Department of Physics, Utrecht University
- April 8     **"(Dynamical) Tidal Effects in the Binary Neutron Star mergers"**, invited seminar, the gravitation group in the AstroParticle and Cosmology laboratory (APC), Paris, France (remotely).
- Feb 28     **"Binary neutron star mergers in massive scalar-tensor theory"**, talk, Gravity and Cosmology 2024, Yukawa Institute for Theoretical Physics, Kyoto, Japan.

### 2023

- Oct 26     **"Binary neutron star mergers in massive scalar-tensor theory: an adiabatic look"**, poster, GravityShapePisa 2023, Pisa, Italy.
- April 5     **"Dynamical Scalarization during BNS mergers in scalar-Gauss-Bonnet"**, talk, CoCoNut meeting, Potsdam, Germany.
- March 22    **"Packed Message delivered by Tides in Binary Neutron Star Mergers"**, parallel talk, SMuK2023, Technical University Dresden, Germany.
- March 16    **"Dynamical Scalarization during Neutron Star Mergers in scalar-Gauss-Bonnet Theory"**, invited seminar, University of Tübingen, Germany.
- February 3   **"Developing waveform involving dynamical tides"**, invited seminar, Academia Sinica, Taipei, Taiwan.
- February 2   **"Gravitational Phase Transition in Massive Scalar-tensor Theory"**, invited seminar, National Center for Theoretical Sciences, Hsinchu, Taiwan.

### 2022

- Sep 10     **"Premerger Neutron Star Physics"**, plenary talk, Eleventh Aegean summer school, Syros, Greece.
- Sep 08     **"Gravitational Phase Transition"**, parallel talk, Eleventh Aegean summer school, Syros, Greece.
- May 16-19   **"Tidal effects in the pre-merger stage of coalescing binary neutron stars"**, e-poster, PHAROS: The multi-messenger physics and astrophysics of neutron stars, Roma, Italy.
- Mar 3      **"Resonance shattering as triggers for precursors of SGRBs"**, parallel talk, DPG Meeting of the Matter and Cosmos Section (SMuK), Heidelberg, Germany. (remotely)

### 2021

- Aug30 - Sep3   **"Tidal  $g$ -mode resonances in coalescing binaries of neutron stars as triggers for precursor flares of short gamma-ray bursts"**, parallel talk  
DPG Meeting of the Matter and Cosmos Section (SMuK), Bad Honnef, Germany. (remotely)
- July 27        **" $g$ -mode resonances as triggers for precursors of SGRBs"**, invited talk  
Grav@zon group seminar, Federal University of Pará, Pará, Brazil. (remotely)

Jun 22      **"Dynamical formation of scalarized black holes and neutron stars through stellar core collapse"**, invited seminar  
cosmo/GW journal club, Johns Hopkins University, Maryland, USA. (remotely)

## 2020

Feb 24-28      **"Inverse-Chirp Imprint of GW in Scalar Tensor Theory"**, parallel talk  
56th Karpacz Winter School in Theoretical Physics, Karpacz, Poland.

### Teaching experience

**At NTHU**      Teaching assistant for General Relativity (2016 Fall, 2018 Fall), Mathematical Physics (2017-2018), Thermal Physics (2016-2017), Calculus (2018-2019)  
**At IAAT**      Teaching assistant for Physical Practical (2021 Summer & Winter)  
Teaching assistant for Grundkurs Elektromagnetismus (2022 Summer)

### Publication List

#### REFEREED ARTICLE

1. V. Brdar, T. Cheng, **H.-J. Kuan**, and Y.-Y. Li. Magnetar-powered neutrinos and magnetic moment signatures at IceCube. [JCAP 07:026, July 2024.](#)
2. A. G. Suvorov, **H.-J. Kuan**, Alexis Reboul-Salze and K. D. Kokkotas. Magnetic amplification in pre-merger neutron stars through resonance-induced magnetorotational instabilities. [Phys.Rev.D 109:103023, May 2024.](#)
3. **H.-J. Kuan** and K. D. Kokkotas. Last three seconds: Packed message delivered by tides in binary neutron star mergers. [Phys. Rev. D 108:063026, September 2023.](#)
4. **H.-J. Kuan**, K. V. Van Aelst, A. T. L. Lam and M. Shibata. Binary neutron star mergers in massive scalar-tensor theory: Quasiequilibrium states and dynamical enhancement of the scalarization. [Phys. Rev. D 108:064057, September 2023.](#)
5. **H.-J. Kuan**, A. G. Suvorov and K. D. Kokkotas. Measuring spin in coalescing binaries of neutron stars showing double precursors. [Astron. Astrophys., 676\(2\):A59, June 2023.](#)
6. **H.-J. Kuan**, A. T. L. Lam, D. D. Doneva, S. S. Yazadjiev, M. Shibata and K. Kiuchi. Dynamical scalarization during neutron star mergers in scalar-Gauss-Bonnet theory. [Phys. Rev. D 108:063033, September 2023.](#)
7. **H.-J. Kuan** and K. D. Kokkotas.  $f$ -mode imprints on gravitational waves from coalescing binaries involving aligned spinning neutron stars. [Phys. Rev. D 106:064052, September 2022.](#)
8. **H.-J. Kuan**, A. G. Suvorov, D. D. Doneva and S. S. Yazadjiev. Gravitational Waves from Accretion-Induced Descalarization in Massive Scalar-Tensor Theory. [Phys. Rev. Lett. 129:121104, September 2022.](#)
9. A. G. Suvorov, **H.-J. Kuan** and K. D. Kokkotas. Quasi-periodic oscillations in precursor flares via seismic aftershocks from resonant shattering. [Astron. Astrophys. 664:A177, August 2022.](#)
10. **H.-J. Kuan**, C. J. Krüger, A. G. Suvorov and K. D. Kokkotas. Constraining equation of state groups from  $g$ -mode asteroseismology. [MNRAS, 513\(3\):4045-4056, April 2022.](#)
11. **H.-J. Kuan**, J. Singh, D. D. Doneva, S. S. Yazadjiev, and K. D. Kokkotas. Nonlinear evolution and nonuniqueness of scalarized neutron stars. *Phys. Rev. D*, 104:124013, December 2021. [10.1103/PhysRevD.104.124013.](#)
12. **H.-J. Kuan**, A. G. Suvorov and K. D. Kokkotas. General-relativistic treatment of tidal  $g$ -mode resonances in coalescing binaries of neutron stars. II. As triggers for precursor flares of short gamma-ray bursts. [MNRAS, 508\(2\):1732-1744, December 2021.](#)
13. D. Huang, C. Q. Geng, and **H.-J. Kuan**. Scalar gravitational wave signals from core collapse in massive scalar-tensor gravity with triple-scalar interactions. [Class. Quant. Grav., 38:245006, November 2021.](#)

14. **H.-J. Kuan**, D. D. Doneva, and S. S. Yazadjiev. Dynamical Formation of Scalarized Black Holes and Neutron Stars through Stellar Core Collapse. *Phys. Rev. Lett.*, 127:161103, October 2021.
15. **H.-J. Kuan**, A. G. Suvorov, and K. D. Kokkotas. General-relativistic treatment of tidal g-mode resonances in coalescing binaries of neutron stars - I. Theoretical framework and crust breaking. *MNRAS*, 506(2):2985–2998, September 2021.
16. C. Q. Geng, **H.-J. Kuan**, and L. W. Luo. Inverse-chirp imprint of gravitational wave signals in scalar tensor theory. *Eur. Phys. J. C*, 80:780, August 2020.
17. C. Q. Geng, **H.-J. Kuan**, and L. W. Luo. Viable Constraint on Scalar Field in Scalar-Tensor Theory. *Class. Quant. Grav.*, 37:115001, May 2020.

## PRE-PRINT

1. A. T.-L. Lam, Yong Gao, **H.-J. Kuan**, M. Shibata, K. Van Aelst, K. Kiuchi. Accessing universal relations of binary neutron star waveforms in massive scalar-tensor theory. [arXiv:2410.00137](#)
2. A. G. Suvorov, **H.-J. Kuan**, K. D. Kokkotas. Premerger phenomena in neutron-star binary coalescences. [arXiv:2408.16283](#)
3. A. T.-L. Lam, **H.-J. Kuan**, M. Shibata, K. Van Aelst, K. Kiuchi. Binary neutron star mergers in massive scalar-tensor theory: Properties of post-merger remnants. [arXiv:2406.05211](#)

## References

- [regular] **Prof. Dr. Kostas Kokkotas**  
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- [regular] **Prof. Dr. Masaru Shibata**  
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**Golm**

**October 24, 2024**

**Hao-Jui Kuan**