Isaac Ruoquan Wang

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Career Experiences

· **Visiting Scholar** **Feb. 2025 -**
Perimeter Institute *ON, Canada*

· **Postdoctoral Research Associate** **Oct. 2023 -**
Fermi National Accelerator Laboratory, Theory Division *Illinois, USA*

Education

Rutgers University - New Brunswick **Sep. 2017 - Sep. 2023**
Ph.D., theoretical particle physics and cosmology *New Jersey, USA*

· **Thesis Advisor**: Prof. David Shih
· **Co-advisor**: Prof. Keisuke Harigaya (U-Chicago)
· **Thesis**: Electroweak (-like) phase transitions: baryogenesis, strong CP, and light particles

Fudan University **Sep. 2013 - Jun. 2017**
B.Sc, department of physics *Shanghai, China*

· **Thesis Advisor**: Prof. Xu-Guang Huang
· **Co-advisor**: Prof. Huan Zhong Huang (UCLA & Fudan U.)
· **Thesis**: Microcausality and CPT violation in chiral quantum electrodynamics

Publications

1. A Thermal Relic Encyclopedia: Dark Matter Candidates Coupled to Quarks, *Dan Hooper, Gordan Krnjaic, Tanner Trickle* and ***Isaac R. Wang***, arXiv: 2512.03133, INSPIRE
2. Widening the Resonance at Ultra-High Energies: Novel Probes of Neutrino Self-Interactions, *Pedro A. N. Machado*, ***Isaac R. Wang***, *Xun-Jie Xu* and *Bei Zhou*, arXiv: 2512.00165, INSPIRE
3. Dark Matter and Baryon Asymmetry from Monopole-Axion Interactions, *Keisuke Harigaya, Raymond T. Co*, ***Isaac R. Wang*** and *Huangyu Xiao*, arXiv: 2511.10603, INSPIRE
4. Filling the Gap: Hunting for Vector Bosons at the MUonE Experiment with Displaced Decay Signature, *Duncan Rocha* and ***Isaac R. Wang***, arXiv: 2511.03222, INSPIRE
5. Upper Bound on Parity Breaking Scale for Doublet WIMP Dark Matter, *Matthew J. Baldwin, Keisuke Harigaya* and ***Isaac R. Wang***, arXiv: 2507.22113, INSPIRE
6. The Discriminant Power of Bubble Wall Velocities: Gravitational Waves and Electroweak Baryogenesis, *Marcela Carena, Aurora Ireland, Tong Ou* and ***Isaac R. Wang***, arXiv: 2504.17841, JHEP 09 (2025) 175, INSPIRE
7. Widen the Resonance: Probing a New Regime of Neutrino Self-Interactions with Astrophysical Neutrinos, ***Isaac R. Wang***, *Xun-Jie Xu* and *Bei Zhou*, arXiv: 2501.07624, Phys.Rev.Lett. 135,181002, INSPIRE
8. Discovering Dark Matter with the MUonE Experiment, *Gordan Krnjaic, Duncan Rocha* and ***Isaac R. Wang***, arXiv: 2409.00170, Phys.Rev.Lett. 134 (2025) 16, 161801, INSPIRE

9. Imprints of light dark matter on the evolution of cosmic neutrinos, ***Isaac R. Wang*** and *Xun-Jie Xu*, arXiv: 2312.17151, JCAP 05 (2024) 050, *INSPIRE*
10. ALP-Assisted Strong First-Order Electroweak Phase Transition and Baryogenesis, *Keisuke Harigaya* and ***Isaac R. Wang***, arXiv: 2309.00587, JHEP 04 (2024) 108, *INSPIRE*
11. Baryogenesis in a Parity Solution to the Strong CP Problem, *Keisuke Harigaya* and ***Isaac R. Wang***, arXiv: 2210.16207, JHEP 11 (2023) 189, *INSPIRE*
12. First-Order Electroweak Phase Transition and Baryogenesis from a Natural Light Singlet Scalar, *Keisuke Harigaya* and ***Isaac R. Wang***, arXiv: 2207.02867, *INSPIRE*
13. Dark Photon and Displaced Vertices in MUonE Experiment, *Iftah Galon*, *David Shih* and ***Isaac R. Wang***, arXiv: 2202.08843, Phys.Rev.D 107 (2023) 9, 095003, *INSPIRE*
14. Axiogenesis from $SU(2)_R$ Phase Transition, *Keisuke Harigaya* and ***Isaac R. Wang***, arXiv: 2107.09679, JHEP 10 (2021) 022, *INSPIRE*
15. Electroweak-like Baryogenesis with New Chiral Matter, *Kohei Fujikura*, *Keisuke Harigaya*, *Yuichiro Nakai* and ***Isaac R. Wang***, arXiv: 2103.05005, JHEP 07 (2021) 224, *INSPIRE*

Selected Talks

Selected and not limited to...

· **BSM light mediator opportunities from ongoing SM experiments** — **Oct. 2025**
U. of Pittsburgh PITT PACC Seminar — *Seminar*

· **BSM light mediator opportunities from ongoing SM experiments** — **Oct. 2025**
LBNL Particle Theory Seminar — *Seminar*

· **BSM light mediator opportunities from ongoing SM experiments** — **Sep. 2025**
New York University HEP Seminar — *Seminar*

· **Progress in bubble wall velocity calculation** — **Aug. 2025**
Lepton Photon 2025 — *Parallel*

· **Discovering dark photon and dark matter at the MUonE experiment** — **Nov. 2024**
UFlorida Theory Seminar — *Seminar*

· **ALP-assisted electroweak phase transition and baryogenesis** — **Apr. 2024**
Argonne Lab Theory Seminar — *Seminar*

· **Imprints of light dark matter on the evolution of cosmic neutrinos** — **Jan. 2024**
U. Chicago EFI Seminar — *Seminar*

· **ALP-assisted electroweak phase transition and baryogenesis** — **Jan. 2024**
Fermilab Theory Seminar — *Seminar*

· **ALP-assisted electroweak phase transition and baryogenesis** — **Nov. 2023**
PIKIMO Fall 2023 — *Short Plenary*

· **Baryogenesis in a parity solution to the strong CP problem** — **May. 2023**
Pheno 2023 — *Parallel*

· **Electroweak baryogenesis from a naturally light singlet scalar** — **Sep. 2022**
Fermilab Theory Seminars — *Seminar*

· **Dark photon and displaced vertex search at the MUonE experiment** — **Jun. 2022**
11th Workshop of the Long-Lived Particle Community (Virtual) — *Short Plenary*

· **Dark photon and displaced vertex search at the MUonE experiment** — **May. 2022**
Pheno 2022 — *Parallel*

· **Baryogenesis from $SU(2)_R$ phase transition** **Jan. 2022**
High-scale Baryogenesis Workshop (Virtual) *Plenary*

· **Axiogenesis from $SU(2)_R$ phase transition** **Nov. 2021**
Brookhaven Forum 2021 (Virtual) *Parallel*

Teaching Experience

- Teaching Assistant, Rutgers University, Introduction to Cosmology 444 **Fall 2021**
- Teaching Assistant, Rutgers University, Analytical Physics 124 **Spring 2019**
- Teaching Assistant, Rutgers University, Analytical Physics 123 **Fall 2018**
- Teaching Assistant, Rutgers University, General Physics Lab 205 **Fall 2017**

Skills

Natural Languages	English, Chinese Mandarin
Programming Languages	Python, C/C++, Mathematica, Emacs-Lisp, CSS, HTML
Computer Skills	Git, LaTeX, Vim/Emacs/VSC, Linux/Unix, Keynote, MS Offices

References

Below is a list of individuals who have provided reference letters for me and had research experiences together since I started my undergrad, *arranged by the time we first met.*

Xu-Guang Huang	**Undergrad thesis advisor**, Fudan University, huangxuguang@fudan.edu.cn
Huan Zhong Huang	**Undergrad co-advisor**, UCLA, huang@physics.ucla.edu
David Shih	**Ph.D. thesis advisor**, Rutgers University, dshih@physics.rutgers.edu
Yuichiro Nakai	Shanghai Jiaotong University & T.D.Lee Institute, ynakai@sjtu.edu.cn
Keisuke Harigaya	**Ph.D. co-advisor**, University of Chicago, kharigaya@uchicago.edu
Marcela Carena	Perimeter Institute, mcarena@perimeterinstitute.ca
Gordan Krnjaic	Fermilab and University of Chicago, krnjaicg@gmail.com
Pedro A. N. Machado	Fermilab, pmachado@fnal.gov