**JINGYUAN WANG**
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## EDUCATION

**Xi'an Jiaotong University (XJTU)** **Xi'an, China**
*BS in Physics* September 2020–June 2024

- GPA: 4.02/4.3
- Average Score: 92.63/100

## PUBLICATION

- **Jing-Yuan Wang**, Qian Zhao*, Mamutjan Ababekri, and Jian-Xing Li*. Radiation-reaction effects on the emission of vortex Gamma-ray photon from the nonlinear inverse Thomson scattering.

## RESEARCH

**Radiation Reaction Effect in Nonlinear Inverse Thomson Scattering of Lasers from Beams and Plasmas** **Xi'an, China**
*Project leader; Supervisor: Prof. Jianxing Li, XJTU* September 2021–Present

- Derived exact solutions for the radiation field of a high-energy electron in the Nonlinear Inverse Thomson Scattering (NITS) process, considering radiation reaction (RR); developed a MATLAB-based numerical computing program for the scattering process to comprehensively analyze the properties of radiated gamma rays
- Utilized a Particle-In-Cell simulation program to simulate NITS of lasers from real plasmas with certain spatial distribution; employed weighted simulation analyses to study NITS from real electron beams
- Analyzed the impact of RR on high-harmonic energy distribution of gamma rays produced in the NITS process, aiming to produce a new type of gamma-ray source capable of emitting higher-energy high-harmonic vortex gamma rays; proposed the symmetry breaking effect of transverse angular momentum due to RR; identified the phenomenon of higher-order resonance function splitting and the phase pattern of Bessel vortex beams induced by RR
- Obtained funding for the National Undergraduate Innovation Training Program *Research on Radiation Reaction in the Generation of Vortex Gamma Rays*; drafting a paper on the research findings for submission to *Physical Review Letters*

**Deep Learning-based Control of Synchronization in Homogeneous Time-delayed Laser Networks** **Xi'an, China**
*Project leader; Supervisor: Prof. Xin Chen, XJTU* February 2023–Present

- Designed and implemented a computational model for coupled laser networks using MATLAB and Python to simulate synchronized cluster formation in coupled laser networks
- Acquired a robust dataset of synchronization parameters through extensive simulation; successfully employed Convolutional Neural Networks (CNN) to predict the occurrence of synchronized clusters in coupled laser networks; extended the applicability of the predictive model by employing the Node2Vec to predict synchronization in large-scale laser networks
- Built a physics-augmented Generative Adversarial Network (GAN) and utilized Ray Tune for hyperparameter tuning to obtain specific parameter sets capable of generating the desired synchronization clusters, offering novel possibilities for network control and customization

**Strong-field Laser-driven High-energy-density Physics Group** **Beijing, China**
*Research intern; Supervisor: Prof. Yutong Li, Chinese Academy of Sciences* June 2023–July 2023

- Deepened expertise in strong-field laser-driven phenomena, particularly terahertz radiation generation and characterization from solid and gas targets
- Investigated principles and challenges of electron wakefield and ion acceleration mechanisms
- Engaged in laboratory astrophysics studies emphasizing radiation opacity in astrophysical settings and the cooling effect on white dwarfs and neutron stars
- Independently authored a research report on the current developments in Strong-field Laser-driven High-energy-density Physics

**Deep-sea Power System Charging Control using Machine Learning** **Xi'an, China**
*Project leader; Supervisor: Prof. Penghua Guo, XJTU* May 2022–May 2023

- Obtained funding for the National Undergraduate Innovation Training Program *Research on Deep-sea Power System Charging Control*
- Established a physical model coupling multiple water turbines in a flow field to obtain performance indicators for each turbine and maximize the average performance indicator; designed a pre-training mode based on Deep Reinforcement Learning
- Applied for the following three patents: Bidirectional Tidal Energy Generation Device Based on the Sabine Rotor (China); Deep-sea Power Generation System and Its Control Method (China); Land-based Testing Platform and Control Method for Deep-sea Power Generation System (China)

**Phase in Driven Harmonic Oscillators** **Xi'an, China**

*Team member; Supervisor: Prof. Aiping Fang, XJTU* June 2021–June 2022

- Obtained funding for the Provincial Undergraduate Innovation Training Program *Research on Coupled Torsional Oscillators*
- Analytically calculated the motion laws of coupled torsional oscillators; utilized MATLAB and Mathematica for numerical simulations to provide a visual representation of phase diagrams of coupled oscillatory differential equations
- Modified potential energy terms through experimental verification; investigated the self-similarity characteristics of phase diagrams of coupled differential equations using chaos theory

## EXTRACURRICULAR ACTIVITIES

**Teaching Experience in Electrodynamics Discussion Group** **Xi'an, China**

*Lecturer* January 2022

- Led sessions on electromagnetic radiation and electromagnetic wave scattering in electrodynamics, assisting students in problem-solving and providing guidance
- Created concise lecture notes and study materials for the sections on electromagnetic radiation and electromagnetic wave scattering
- Facilitating class discussions and problem-solving sessions using multimedia resources to enhance students' understanding of fundamental electromagnetics concepts

**Peking University National Physics Excellent Student Summer School (Topic: Extreme Optics)** **Beijing, China**

*Participant* July 2021

- Participated in comprehensive academic activities centered on "Extreme Optics", covering areas such as mesoscopic and nano-optics, quantum optics, femtosecond science, and optoelectronic materials and devices
- Gained comprehensive insights into state-of-the-art advancements and research trends in the field of extreme optics by engaging with leading experts through lectures and discussions
- Acquired hands-on experience during laboratory visits and practical sessions; enhanced the understanding of experimental techniques and research methodologies in the field

## HONORS AND AWARDS

- Yan Jici Class Scholarship, Institute of Physics, Chinese Academy of Sciences — April 2023
- National Scholarship for Undergraduate and Junior College Students, Ministry of Education, PRC — December 2022
- Outstanding Student, XJTU — December 2022
- National Scholarship for Undergraduate and Junior College Students, Ministry of Education, PRC — December 2021
- Advanced Individual in Social Activities, XJTU — December 2021
- Second Prize, National College Student Mathematics Competition — December 2021
- Everest Scholarship for Physics Experimental Class, XJTU — September 2021
- Second Prize, National China Mechanics Competition in Honor of Zhou Peiyuan — August 2021
- Second Prize, National China Undergraduate Physics Tournament — August 2021
- Special Prize, Northwest Division of China Undergraduate Physics Tournament — June 2021

## COMPETENCIES

- **Programming:** Proficient in MATLAB, Python, Mathematica, Origin, and LaTeX
- **Language:** Mandarin (native) and English (fluent)