

Jiaxuan Chen 陈嘉轩

Physicist (Sc.M., Brown University), now an independent researcher across foundations of physics, gravitational-wave methodology, ML interpretability, and the political economy of technology — favoring sharp, honestly-scoped results over grand claims.



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01 ABOUT

Physicist trained across high-energy, condensed-matter, and astrophysical experiment, now working as an independent researcher at the intersection of foundations of physics, gravitational-wave methodology, machine-learning interpretability, and the political economy of technology. My work favors sharp, honestly-scoped results — obstruction theorems, calibration certificates, and pre-registered falsification — over grand unverified claims.

02 EDUCATION

Brown University — Sc.M. in Physics 2024 – 2026

Providence, Rhode Island, USA. Research spanned CMS jet physics and carbon-nanotube 3ω thermal characterization.

Shandong University — B.S. in Space Science and Technology 2020 – 2024

School of Space Science and Physics. Undergraduate work in X-ray binary and stellar-flare astrophysics.

Technological Monopoly Rent: A Category for the Political Economy of the New Productive Forces

PUBLIC · SSRN · [SSRN](#) ·

public preprint (not peer-reviewed) · posted 19 Jun 2026 · Abstract 6950759

A bounded conceptual paper naming "inference rent" / technological monopoly rent as the above-normal return that arises when high-fixed-cost, non-rival AI model capability is metered into priced scarcity.

[SSRN abstract 6950759](#)

[SSRN author page](#)

Formation Mechanism of Blazar Jets

ACCEPTED · [CONF-CIAP 2023](#) ·

2nd Intl. Conf. on Computational Innovation and Applied Physics · 2023

Single-author conference paper on the formation mechanism of blazar (AGN) jets, fitting jet power spectra via Blandford–Payne / Blandford–Znajek theory.

A Universal Prior Selects No Preferred Factorization: A Bounded-Alphabet Locality No-Go, with the Same Cross-Context Gap Recurring in Born-Rule Derivations

MANUSCRIPT PREPARED · [SciPost Physics Core](#) · foundations of physics · single author · 2026

Proves that a universal (Solomonoff–Levin) algorithmic prior selects no preferred tensor factorization — via a constant-complexity carry-increment recoding — and therefore cannot by itself supply locality, then maps the same cross-context gap route-by-route across derivations of the Born rule.

Covariance-Estimator Dependence of Ringdown Overtone Significance: A Coverage-Validated Real-Noise Calibration Standard

MANUSCRIPT PREPARED · [RASTI \(OUP/RAS\)](#) · gravitational-wave methods · single author · 2026

Shows a black-hole ringdown overtone's reported significance can swing by an order of magnitude with the analyst's noise-covariance estimator, and introduces a coverage-validated, covariance-choice-independent real-noise calibration standard, demonstrated on GW250114 and GW150914.

Unified Theory for 3ω Thermal Characterization: Finite Heater Length and Environmental Coupling Effects

IN PREPARATION [Kuehne group, Brown](#) · [arXiv:2602.00001](#)

co-authored (C. Peng, J. Chen, J. Ginzburg, M. Kuehne) · draft Feb 2026

Co-authored manuscript deriving an analytical, unified 3ω impedance theory for a finite-length heater across vacuum, isotropic-fluid, and on-substrate environments, including heater heat capacity and interfacial boundary resistance.

Study of the Outburst Process of the Black-Hole X-ray Binary MAXI J1348-630

THESIS [Shandong University](#) · undergraduate graduation thesis · 2024

Undergraduate thesis analyzing NICER and NuSTAR observations of the black-hole X-ray binary MAXI J1348-630, fitting power-density and energy spectra to identify outflow structure and estimate outflow velocity and timescales.

Omytea – A Density-Matrix Belief-State World Model

ACTIVE Independent theoretical / computational physics research program • 2026

A research program, in the mold of a small lab, that represents uncertainty over multiple futures as an open-system density matrix (ρ), evolves it with an operator/channel algebra, and revises it through a proper-scored, auditable measurement-update ledger — aimed ultimately at a Grand Unified World Model. The honest current headline is a calibrated, auditable system with no demonstrated raw-accuracy advantage over strong classical baselines; the program makes no primacy or "beats-baseline" claim. In-preparation manuscripts include an honest negative-result systems paper (real-data L3 calibration/coverage certificate) and a Lindblad-form open-system extension of Cui & Ma (2026).

ACAEXPL – Certificate-Discipline Physics (Gravitational Waves & Tachyon Theory)

ACTIVE Independent, pre-registration-disciplined research program • since Jun 2026

An independent, pre-registration-disciplined program whose most mature output is the coverage-validated real-noise ringdown significance standard (see Publications). Running in parallel are an in-preparation feature-local certificate for gravitational-wave population-feature significance (applied to GWTC-4) and an independent theoretical strand on tachyonic phase-boundary classification with a formalized finite-window certificate line.

Random Sequence Scintillation (RSS) – Foundations of Physics

ACTIVE Independent foundations-of-physics research program • 2024-2026

An independent foundations-of-physics program taking observer self-states plus a Solomonoff-prior-weighted transition rule as primitive, and asking what physics (locality, modular flow, the Born rule) does and does not follow from the universal prior. After a 2026 self-audit, it is expressed mainly through honest obstruction / delimitation / negative-result manuscripts — including the SciPost-bound locality no-go (see Publications), an algorithmic-idealism $\rightarrow$ modular-flow delimitation, a half-line free-fermion type-forced mass-axis obstruction, and Boltzmann-brain / other-minds diagnostics.

Calibrated Belief-State Probing in LLMs

IN PREPARATION Independent ML-interpretability research (pre-registered) · 2026

A pre-registered replication-and-extension study testing whether an LLM's uncertainty and incorrectness live in separable sparse-autoencoder features that enable coverage-guaranteed abstention. At Gemma-2-2B scale it delivers an honest-negative headline (the anchor result does not replicate; softmax confidence beats the SAE probe), with the surviving contribution a score-agnostic two-mode distribution-free risk certificate.

Swindo

IN DEVELOPMENT · Product engineering · golf-motion software · 2026

Developing capture and calibration workflows for golf-motion data, together with product interfaces and website engineering.

[Project note ↗](#)

omytea-quantum-substrate

PUBLIC · PYPI · Open-source Python library (Apache-2.0) · v0.1.x · 2026

A dependency-light (numpy + stdlib) standalone Python library providing the density-matrix / open-system quantum substrate used by the Omytea program, released via GitHub OIDC Trusted Publishing.

[PyPI](#)

[GitHub](#)

Omytea Personal Future Console

PUBLIC · LIVE DEMO · Open-source decision-support app · GitHub + Streamlit · 2026

A probability-calibrated, local-first decision-support tool: enter a decision or upload a short video and get multiple future scenarios with calibrated probabilities, operator-coherence decay, and measurement-update as new evidence arrives; built on omytea-quantum-substrate.

[GitHub](#)

[Live demo](#)

GolfCal-1k

INTERNAL · IN PREP · Calibration benchmark spec + reference harness · L2-synthetic · 2026

A calibration-first benchmark specification and reproducible reference harness for probabilistic golf-shot forecasting — predicting a categorical landing distribution scored by Brier, Energy Score, reliability, adaptive-conformal coverage, and strokes-gained — shipping a hierarchical Dirichlet-categorical baseline.

BOOK · KINDLE AVAILABLE · single-author · self-published · 2026

An Invitation After Abundance: *Reading the Present, Wagering the Future*

An independent, original political-economy treatise (~1,162 pp) introducing the category of *Technological Monopoly Rent* to analyze how six simultaneous technological ruptures — AI, quantum, brain-computer interfaces, gene editing, robotics, fusion — are being enclosed as private property. Kindle edition live; paperback and hardcover in final proof.

ISBN 979-8-9960105-0-9 (ebook)

979-8-9960105-2-3 (paperback)

979-8-9960105-3-0 (hardcover)

Stack Power: Frontier AI and the Politics of Market Non-Correction

IN PREPARATION · [International Organization \(CUP\)](#) · journal essay · 2026

An essay distinguishing competition from correction in frontier AI, introducing "stack power" — the persistence and relocation of private control across compute, cloud, energy, deployment, and state-procurement layers even as model-layer prices fall.

Camera, Player, Engine: An Epistemology for Writing About a System You Are Inside

COMPANION ESSAY · PUBLIC · method / epistemology · PDF · 2026

A methodological essay proposing a camera / player / engine typology for how claims about a technological system function when the analyst is embedded inside that system.

Magazine essays — "The Abundance That Isn't" & "The Rent Machine"

DRAFT · NOT YET PLACED

standalone essays drawn from the book · pitched to Noema & Phenomenal World · 2026

Two standalone essays adapting the book's argument — that simultaneous technological abundance is being enclosed rather than shared, and a rent-decomposition of that enclosure.

CMS Jet Physics – Roloff Group, Brown University

Graduate research • Brown University • 2024–2026

High-energy experimental physics on CMS jet physics, including jet-simulation work with PYTHIA; jet structure, parton-shower cascades, and beyond-the-Standard-Model signatures in jet topology.

Carbon-Nanotube 3ω Thermal Characterization – Kuehne Group, Brown University

Graduate research • Brown University • 2024–2026

Condensed-matter thermal-transport research on 3ω characterization of single-walled carbon nanotubes, contributing to a unified finite-heater 3ω impedance theory (see Publications).

MAXI J1348-630 X-ray Binary – Shandong University

Undergraduate research • Shandong University • 2023–2024

Astrophysical data analysis of NICER / NuSTAR observations of the black-hole X-ray binary MAXI J1348-630 (basis of the undergraduate thesis).

TOI Stellar-Flare Spectroscopy – Shandong University

Undergraduate research • Shandong University • 2022–2023

Spectroscopic study of stellar flares on TESS Objects of Interest (TOI) to assess exoplanet habitability and radiation environment.

AGN / Blazar Jets – University College London

Research project • University College London • 2022–2023

Astrophysics project on AGN / blazar jets, underpinning the CONF-CIAP 2023 conference paper on blazar-jet formation.

In-Beam γ -ray Spectroscopy – Shandong University

Undergraduate research · Shandong University · 2022

Nuclear-physics research in in-beam γ -ray spectroscopy, analyzing γ spectra from α -induced reactions to identify residual nuclides.

Axion-Like Dark Matter – Beijing Normal University

Research project · Beijing Normal University · 2022

Theory / phenomenology on axion-like dark matter, analyzing photon survival probabilities to constrain the parameter space.

08 TECHNICAL SKILLS

Computational & Analytical

- Python (numpy · scientific stack)
- Open-system / density-matrix simulation
- Gravitational-wave data analysis
- Real-noise covariance calibration & coverage validation
- Conformal prediction · distribution-free risk certificates
- X-ray / timing spectral fitting (NICER · NuSTAR · HEASOFT)
- High-energy jet simulation (PYTHIA)
- Lean formalization

Writing & Publishing

- LaTeX / RevTeX manuscript preparation
- Pre-registration & falsification discipline
- Bilingual (English / 中文) academic & long-form writing
- Independent book production & self-publishing

Open to research & collaboration.

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