

Research Interests

Early-universe cosmology; first-order phase transitions; stochastic gravitational waves; dark sectors; thermal history of the universe.

Education

Northeastern University, Boston, MA — Ph.D. in Physics	Sept 2020 – Present
Advisor: Prof. Pran Nath	
Stony Brook University, Stony Brook, NY — B.S. in Physics & Mathematics	Aug 2016 – Dec 2019
GPA: Overall 3.72/4.00; Physics 3.82/4.00; Mathematics 3.72/4.00	

Publications

1. W.-Z. Feng, **J. Li**, P. Nath and Z.-H. Ye, “Gauge-Invariant Gravitational Waves from Cogenesis in a $B - L$ Conserving Universe,” arXiv:2510.13770.

2. **J. Li** and P. Nath, “Supercooled Phase Transitions: Why Thermal History of Hidden Sector Matters in Analysis of Pulsar Timing Array Signals,” arXiv:2501.14986.

3. W.-Z. Feng, **J. Li**, and P. Nath, “Cosmologically Consistent Analysis of Gravitational Waves from Hidden Sectors,” arXiv:2403.09558.

4. **J. Li**, P. Nath and Raza M. Syed, “A natural MSSM from a novel $SO(10)$, Yukawa unification, light sparticles, and SUSY implications at LHC” arXiv:2503.19871.

5. **J. Li** and P. Nath, “Big Bang Initial Conditions and Self-Interacting Hidden Dark Matter,” arXiv:2304.08454.

Research & Professional Experience

High Energy Theory Group, Northeastern University	Jan 2022 – Present
Advisor: Prof. Pran Nath	
- Research on dark sectors, early-universe evolution, and gravitational-wave signatures from first-order phase transitions. - Develop and validate numerical pipelines for effective potentials, tunneling/bounce actions, and GW spectra.	
Teaching Assistant, Northeastern University	Sept 2020 – Present
Teaching assistant for Quantum Mechanics, Quantum Field Theory, Particle Physics, Cosmology, Electronics laboratories, and Undergraduate Physics Laboratories	
PiTP Summer School, IAS	July 2025
Topic: Gravitational Waves from Theory to Observation	
Physics Tutorial in Advanced Topics, Stony Brook University	Aug 2019 – Dec 2019
Advisor: Prof. Martin Roček	
Independent study: <i>Lie Groups in Particle Physics</i>.	
ATLAS Research Group, Stony Brook University	May 2018 – May 2019
Advisor: Prof. Giacinto Piaquadio	
- Multivariate analysis of $H \rightarrow b\bar{b}$ decay - Implemented deep learning and boosted decision trees for signal discrimination.	
Mathematics Honors Thesis, Stony Brook University	Sept 2018 – Dec 2018
Advisor: Prof. Marcus Khuri	
Thesis: <i>Introduction to Characteristic Classes</i>; covered vector bundles, cohomology, Stiefel–Whitney classes, and applications.	

Awards & Honors

Undergraduate Dean’s List (5 semesters)
Undergraduate Honors Program in Mathematics and Physics
Sigma Pi Sigma, National Physics Honor Society

Technical Skills

Coding:	Python, C++, C#, Fortran, Visual Basic, L ^A T _E X
Software:	ROOT, Mathematica, Keras, PyTorch

Research Talks

Invited Talk 2025 Postdoctoral Frontier Symposium in Physics and Astronomy; TDLI, Shanghai, September 2025; “Cosmological First order Phase Transition Aspects: Supercooling and Gauge Invariance”

Other Interests

Indie game developer, Bassist in a band, LLM related. See more on my personal website <https://jinzheng.li>.