Anindita Maiti

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Education

2017 – 2023 **Northeastern University**, Boston, Massachusetts, USA
Doctor of Philosophy in Physics Candidate
Advisor: James Halverson.

2020 – 2023 *PhD student*: **The NSF AI Institute for Artificial Intelligence and Fundamental Interactions**, Boston, Massachusetts, USA.

2012 – 2017 **IIT Bombay**, Mumbai, India
Integrated Bachelor and Master of Technology in Engineering Physics
Advisor: Urjit Yajnik. *(Graduated with Honors in physics).*

Research Interests

Neural Networks for Quantum Field Theories. Quantum Field Theories for Neural Networks. Machine Learning for Effective Field Theories & String Theory. Physics for Machine Learning. String Theory. Machine Learning for Physics.

Publications

A. Maiti, K. Stoner, and J. Halverson, *Symmetry-via-Duality: Invariant Neural Network Densities from Parameter-Space Correlators*, [arXiv:2106.00694v1] (in press).

J. Halverson, C. Long, **A. Maiti**, B. Nelson, G. Salinas, *Gravitational waves from dark Yang-Mills sectors*, JHEP **05** (2021), 154, [arXiv:2012.04071].

J. Halverson, **A. Maiti**, and K. Stoner, *Neural Networks and Quantum Field Theory*, Mach. Learn. Sci. Tech. **2** (2021) no. 3, 035002, [arXiv:2008.08601].

Ongoing Projects

Locality & Non-Gaussianity in Neural Network Field Theories - with James Halverson, Keegan Stoner, Matthew D. Schwartz (ongoing)

RL Exploration of Chiral Gauge Theories - with James Halverson (ongoing)

Invited Conference Talks and Colloquia

Oct 2022 — TBA
UCI Physics Astro/Particle-ML seminar series, *UC Irvine*

Oct 2022 — TBA
Mathematics Seminar, *City, University of London*

Oct 2022 — TBA
Theoretical Physics Seminar, *Uppsala University*

Sept 2022 — TBA
Majorana-Raychaudhuri seminar series, *INFN & University Salerno, Italy & PAMU, Indian Statistical Institute, Kolkata, India*

Sept 2022 — Non-perturbative Non-Lagrangian Neural Network Field Theories
Computational Algebra Seminar Series, *University of Nottingham, UK*

Aug 2022 — Neural Networks and Quantum Field Theories
Journal Club: Pehlevan Research Group, *Harvard University*

June 2022 — Non-Gaussianities in Neural Network Field Theories [Slides]
Short Talk, **Workshop: A Deep-Learning Era of Particle Theory**, *Mainz Institute for Theoretical Physics, Johannes Gutenberg University*

Dec 2021 — A Tale of Symmetry and Duality in Neural Networks [Slides, Video]
Plenary Session Talk, **String Data 2021**, *U. of Witwatersrand & U. of Cape Town*

May 2021 — NN-QFT Correspondence and Symmetries via Duality [Slides]
QFT Research Seminar, *Institute for Theoretical Physics - Münster (WWU)*

May 2021 — NN-QFT Correspondence and Symmetries [Slides]
Joint High Energy Theory & Machine Learning Seminar - *Heidelberg University, LMU Munich and Northeastern University*

Oct 2020 — The NN-QFT Correspondence [Slides, Video]
Seminar Series on String Phenomenology

Feb 2021 — The NN-QFT Correspondence [Slides]
Journal Club, *The NSF AI Institute for Artificial Intelligence and Fundamental Interactions*

Jan 2020 — RL Exploration of Chiral Gauge Theories [Slides]
Gong Show Talk, **Strings, Geometry, and Data Science**, *Simons Center for Geometry and Physics*

Contributed Talks

Sept 2022 — Neural Networks as Non-perturbative Field Theories
Journal Club, *The NSF AI Institute for Artificial Intelligence and Fundamental Interactions*

Aug 2022 — Where Neural Network Meets Fundamental Physics
Poster, **Summer Workshop 2022**, *The NSF AI Institute for Artificial Intelligence and Fundamental Interactions*

Aug 2022 — Where Neural Network Meets Fundamental Physics
Lightning Talk, **Summer School 2022**, *The NSF AI Institute for Artificial Intelligence and Fundamental Interactions*

July 2022 — Neural Network Field Theories [Slides]
Parallel Session Talk, **String Phenomenology 2022**, *University of Liverpool, UK*

May 2022 — Non-Gaussianities of Neural Network Field Theories [Slides]
Lightning Talk, **Discovering Latent Structure in Artificial and Physical Systems** - Internal Workshop, *The NSF AI Institute for Artificial Intelligence and Fundamental Interactions*

Mar 2022 — Symmetries and Dualities in Neural Networks / Field Theory Correspondence [Slides]
Lightning Talk, **IAIFI-AIMLAC Workshop**, *The NSF AI Institute for Artificial Intelligence and Fundamental Interactions*

June 2021 — Neural Networks - QFT Correspondence [Slides]
Gong Show Talk, **TASI 2021**

Dec 2020 — Output Dimension Effects in Untrained NN [Slides]
Gong Show Talk, **String Data 2020**, *CERN*

Awards and Honors

Summer 2022 — Travel Grant (Northeastern University Dept. of Physics)

Summer 2022 — Travel Grant (PhD Network, Northeastern University)

Spring 2021 — Dean's Graduate Student Excellence Award in Research (Northeastern University College of Science)

Spring 2018 — Lawrence Award for Graduate Academic Excellence (Northeastern University Dept. of Physics)

Summer 2014 — Indian Academy of Sciences Summer Research Fellowship (Indian Academy of Sciences)

Professional Service Activities and Outreach

High School Outreach: Presenting Theoretical High Energy Physics research at Northeastern University to high school students (Jul 2022)
Referee: NeurIPS 2021 workshop on Machine Learning and the Physical Sciences; Foundations of Physics; NeurIPS 2020 workshop on Machine Learning and the Physical Sciences
Member: Graduate Student Council, Northeastern University College of Science (Sept 2020 - Aug 2022)
Member: Early Career and Equity Committee, The NSF AI Institute for Artificial Intelligence and Fundamental Interactions. (Jan 2021 - Dec 2022)
Coordinator & Initiator: Graduate Women in Physics Society, Northeastern University Dept. of Physics (Sept 2021 - Present)
Volunteer & Co-organizer: The 1st International Electronic Conference on Mathematics and Applications (May, 2023)
Volunteer: Contributed to organization of String Phenomenology 2020, Northeastern University

Teaching

Northeastern University, Boston, Massachusetts

Teaching Assistant	PHYS 7325: Quantum Field theory 1 (Fall 2020, Fall 2019); PHYS 5115: Quantum Mechanics (Spring 2020, Spring 2019); PHYS 3601: Classical Dynamics (Fall 2018); PHYS 2305: Thermo and Statistical Mechanics (Spring 2018)
Instructor	PHYS 1155: Physics for Engineering 2 (Fall 2017); Advanced Physics Lab - PHYS 3600; Undergraduate Physics lab - PHYS 1148, 1152, 1156; College of Professional Studies Physics Lab - PHYS 1201, 2201

IIT Bombay, Mumbai, India

Instructor	PH 117: Undergraduate Physics lab (Spring 2017); EP 215: Undergraduate Electronics lab (Fall 2016)

Technical skills

Programming languages
Python, C, C++, Mathematica, Matlab, Pytorch
Software
LaTeX, Git

References

(1) Professor James Halverson,
Dept. of Physics, Northeastern University,
The NSF AI Institute for Artificial Intelligence and Fundamental Interactions