Anindita Maiti

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Education

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

2020 – Present *PhD student* at **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] .

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

Non-Gaussianity & Locality of 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

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]
Online Seminar, **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

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)

Schools Attended

IAIFI PhD Summer School, The NSF AI Institute for Artificial Intelligence and Fundamental Interactions Aug 2022
Deep Learning Theory Summer School at Princeton, Princeton University Jul 2021
Theoretical Advanced Study Institute (TASI) – Black Holes, Quantum Information, and Dualities, University of Colorado, Boulder June 2021

Professional Service Activities and Outreach

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 - Present)
Member: Early Career and Equity Committee, The NSF AI Institute for Artificial Intelligence and Fundamental Interactions. (Jan 2021 - Present)
Coordinator & Initiator: Graduate Women in Physics Society, Northeastern University Dept. of Physics (Sept 2021 - Present)
Volunteer: Contributed as a student organizer to String Phenomenology 2020, Northeastern University

Conferences, Seminars, Workshops Attended

IAIFI Summer Workshop, The NSF AI Institute for Artificial Intelligence and Fundamental Interactions Aug 2022
String Phenomenology 2022, University of Liverpool Jul 2022
Bethe Forum 'Machine Learning: Where to Apply in Theoretical Physics', Bethe Center for Theoretical Physics, Bonn June 2022
A Deep-Learning Era of Particle Theory, Mainz Institute for Theoretical Physics, Johannes Gutenberg University June 2022
IAIFI-AIMLAC Workshop, The NSF AI Institute for Artificial Intelligence and Fundamental Interactions Mar 2022
String Data 2021, University of Witwatersrand & University of Cape Town Dec 2021
String Phenomenology 2021, Northeastern University Jul 2021
String Data 2020, CERN Dec 2020
String Phenomenology 2020, Northeastern University June 2020
Strings, Geometry, and Data Science, Simons Center for Geometry and Physics, Stony brook University Jan 2020
APS 2019 Meeting of the Division of Particles & Fields, Northeastern U. Jul 2019
Indian String Meeting 2018, IISER Thiruvananthapuram, India Dec 2018
F-Theory Conference, CMSA, Harvard University Sept 2018
Workshop on Data Science and String Theory, Northeastern University Nov 2017

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