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

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: Contributed as a student organizer to String Phenomenology 2020, Northeastern University

Conferences, Seminars, Workshops, Schools Attended

IAIFI Summer Workshop, The NSF AI Institute for Artificial Intelligence and Fundamental Interactions   Aug 2022

IAIFI PhD Summer School, 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

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 *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