# Anindita Maiti

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Forsyth St., Boston, MA 02115

## Education

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| 2017 – Present | **Northeastern University**, Boston, Massachusetts, USA<br>*Doctor of Philosophy in Physics Candidate*<br>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<br>*Integrated Bachelor and Master of Technology in Engineering Physics*<br>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

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

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*

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| June 2021 | Neural Networks - QFT Correspondence [Slides] |
| | *Gong Show Talk*, **TASI 2021** |
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| Dec 2020 | Output Dimension Effects in Untrained NN [Slides] |
| | *Gong Show Talk*, **String Data 2020**, *CERN* |

## Awards and Honors

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| 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

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| *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

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|---|---|
| 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

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| 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