

# 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 in Effective Field Theories and String Theory. String Theory. Effective Field Theories.

## 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

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

**Programming languages**

Python, C, C++, Mathematica, Matlab, Pytorch

**Software**

L<sup>A</sup>T<sub>E</sub>X, Git

**References**

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