# Pratyush Das


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## Education

**Institute of Engineering & Management, Kolkata** 2017-2021(Expected)
*Bachelor of Technology in Computer Science and Engineering. CGPA: 8.04/10*

**Don Bosco School, Park Circus, Kolkata** 2016
*High School*

## Experience

**IRIS-HEP - Fellow** June, 2020 - September, 2020
Supervisor - Dr. Jim Pivarski(Princeton University)
- Awkward Array: Library for nested, variable-sized data using NumPy-like idioms
  - Created a source to source compiler to generate equivalent Python for a subset of C++.
  - Created a property based testing framework.
  - Created a source to source compiler to generate equivalent parallel CUDA from specification(Python and type information).

**IRIS-HEP - Fellow** June, 2019 - September, 2019
Location: Fermi National Accelerator Laboratory, USA - LHC Physics Centre
Supervisor - Dr. Jim Pivarski(Princeton University)
- uproot: Python implementation of ROOT I/O, an open source file format storing over an exabyte of HEP data
  - Completed ROOT file writing interface by adding functionality to write ROOT files with TTrees.
  - uproot has become one of the most widely used Physics libraries (100K+ downloads)

**DIANA-HEP - Fellow** June, 2018 - September, 2018
Location: Fermi National Accelerator Laboratory, USA - LHC Physics Centre
Supervisor - Dr. Jim Pivarski(Princeton University)
- uproot
  - Co-developed the uproot library with Jim Pivarski; authored the ROOT file writing interface.
  - Examined ROOT serialization of objects and added functionality to write ROOT files with strings and histograms.

**DIANA-HEP - Summer Student** June, 2017 - August, 2017
Supervisors - Dr. Jim Pivarski(Princeton University), Dr. Viktor Khristenko(CERN)
- spark-root - Apache Spark datasource for ROOT
  - Separated spark bindings from TTree reading code.
- root4j - Java implementation of ROOT file reader
  - Optimized codebase to facilitate interoperability

## Summer Schools

**Computational and Data Science for High Energy Physics** 2019
*Princeton University*

## Programming Languages and Tools

**Experienced:** Python, CUDA, *nix
**Familiar:** C, C++, Java, ROOT, Haskell, Standard ML

## Publications

- J.Pivarski, I.Osborne, **P.Das**, A.Biswas, P.Elmer, "Awkward Array: JSON-like data, NumPy-like idioms", Proceedings of the 19th Python in Science Conference (SciPy, USA), 2020, Pages 68-74, DOI: 10.25080/Majora-342d178e-00b. 2020
- E.Rodrigues, et al., "The Scikit HEP Project - overview and prospects", Proceedings of the 24th International Conference on Computing in High Energy and Nuclear Physics (CHEP 2019), Adelaide, Australia, 2019. 2020
- N.Saha, **P.Das**, H.N.Saha, "Authorship Attribution of Short Texts using a Multi Layer Perceptron", International Journal of Applied Pattern Recognition, 2018 Vol. 5 No. 3, Pages 251-259, DOI: 10.1504/IJAPR.2018.10016100. 2018

## Talks at Conferences

- Python in High Energy Physics.
  *-PyCon USA (Remote)* 2020
- Python in High Energy Physics
  *-SciPy India (Indian Institute of Technology, Bombay)* 2019
- The Scikit-HEP Project: Overview and Prospects - Eduardo Rodrigues et al.
  *-24th International Conference on Computing in High Energy and Nuclear Physics (University of Adelaide)* 2019
- Writing files with uproot *(DOI: 10.5281/zenodo.3959734)*
  *-PyHEP (Abington, UK)* 2019
- Writing files with uproot
  *-ROOT Users' Workshop (Academy of Sciences and Arts of Bosnia and Herzegovina)* 2018

## Talks at Meetings

- Language Transformations for the Awkward Array library
  *-IRIS-HEP Fellow Presentations (Remote)* 2020
- CUDA backend for the Awkward Array project
  *-Princeton University Liberty Research Group Meeting (Remote)* 2020
- PR 5297: Testing Facilities - Vassil Vassilev, Pratyush Das
  *-ROOT Team Meeting (Remote)* 2020
- Writing TTrees with uproot
  *-IRIS-HEP Topical Meeting: Summer student project presentations (Remote)* 2019
- Writing files with uproot
  *-DIANA Meeting: Updates on ROOT I/O (Remote)* 2018
- Separation of Concerns - Refactoring code between ROOT4J and Spark-Root
  *-DIANA Meeting: Student Projects (Remote)* 2017
  *-CMS Big Data Science Projects (Remote)* 2017

## Academic Achievements

- Awarded the IRIS-HEP undergraduate fellowship by Princeton University. 2020
- Awarded travel grant to speak at PyCon USA 2020 in Pittsburgh, USA. 2020
- Awarded travel grant to attend PLMW and POPL 2020 in New Orleans, USA. 2019
- Awarded travel grant to attend CoDaS-HEP summer school at Princeton University. 2019
- Awarded the IRIS-HEP undergraduate fellowship by Princeton University. 2019
- Awarded travel grant to speak at ROOT Users' Workshop 2018 in Sarajevo, Bosnia and Herzegovina. 2018
- Awarded the DIANA-HEP undergraduate fellowship by Princeton University. 2018

## Extracurricular Achievements

- International Rated Chess Player (Federation Internationale des Echecs) 2016
- Adhyayan National Student Leadership Contest (Adhyayan India) - Third 2015
- IT Quiz (Computer Society of India) - Second 2014

## Major Open Source Contributions

- uproot (Core developer) - Designed ROOT file writing interface.
- Awkward Array - Designed transpilers from a subset of C++ to Python and parallel CUDA, and an automatic test generator.
- uproot-methods - Enabled support to recognize hook for multidimensional uproot histograms.
- root4j - Optimized interface for interoperability.
- spark-root - Separated spark bindings from TTree reading code.
- cling - Configured installer to build using LLVM binary.[Supervised by Dr. Vassil Vassilev(Princeton University)]
- ROOT - Added ROOTUnitTestSupport and fixed several rootcling bugs.[Supervised by Dr. Vassil Vassilev(Princeton University)]
- Clang - Upstreaming patches from Cling.[Supervised by Dr. Vassil Vassilev(Princeton University)]

## Test scores

- **GRE:** Verbal Reasoning - 160, Quantitative Reasoning - 163, Analytical Writing - 4.5
- **TOEFL:** Reading - 29, Listening - 29, Speaking - 24, Writing - 30

## Featured in Media

- *Princeton leads efforts to develop national data training framework for high energy physics* - Princeton University News 2019