

# Ryan Reece, Ph.D.

Data scientist / machine learning scientist / physicist

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## EXPERIENCE

**Insight AI Fellow** | January 2018 - present

[Insight Data Science](#), Palo Alto, CA

- 7 week fellowship: learned about data science and machine learning applications in a variety of business domains.
- Development of a cloud-based hyperparameter optimization platform: [HYPR.AI](#), for automating the testing of many ML models in AWS/Paperspace containerized jobs.

**Postdoctoral Research Fellow** | July 2013 - August 2017

[Santa Cruz Institute for Particle Physics](#), The University of California, Santa Cruz, and

The European Organization for Nuclear Research ([CERN](#)), Geneva, Switzerland

- I've spent 10 years, time as a postdoc and a Ph.D. student, as a member of the ATLAS experiment, a 3000+ person collaboration looking for new physics in high energy proton-proton collisions at the Large Hadron Collider (LHC).
- LHC data has a challenging rate (~10 PB/year) and requires distributed computing for the analysis. The ATLAS codebase has more than 10 million lines of C++ and almost as many lines of Python.
- I have become an [expert in petabyte data reduction](#), high-throughput computing, world-wide grid computing, and [data visualization](#) as a primary user and supporter of our group's 200-CPU computing cluster, on which I have accumulated more than [350k CPU-hours](#).
- I have played leading roles in searches for signals of supersymmetry and other exotic decays. In two such projects, I was one of two "Editors" that serve as the [management leads of a team of 5-8 analyzers](#), eventually write the paper, and defend its approval—over a period of about a year.
- 2015-17, I moved to Geneva to be at CERN full-time to support the operations of the [data acquisition system \(DAQ\)](#) and detector monitoring systems of the SCT (a tracking sub-detector in ATLAS).
- 2017, I have been building more [expertise in machine learning techniques](#), including deep learning frameworks and probabilistic databases. I have been doing research using Keras to build CNNs for particle classification, and in another project using BayesDB and sklearn for [anomaly detection](#).

**Graduate Researcher** | June 2006 - July 2013

[The University of Pennsylvania](#), Philadelphia, PA, and

The European Organization for Nuclear Research ([CERN](#)), Geneva, Switzerland

- I spent my first summers as a student with Penn (2006-08) at CERN, participating in the [integration and commissioning of custom electronics](#) for the Transition Radiation Tracker (TRT), the outermost sub-detector of the ATLAS tracker.
- 2009-12, throughout most of the running of the LHC I rotated with others the [on-call responsibility](#) for the TRT DAQ.
- The focus of my Ph.D. research with the data from ATLAS has been on the identification of decays of tau leptons and their use in searches for new physics, basically a [pattern recognition](#) problem to identify a type of particle.
- 2009-10, I played leading roles in the development of the cut-based tau identification used with the first ATLAS data.
- 2010-12, I helped develop advanced tau identification using [Boosted Decision Trees \(BDTs\)](#) which superseded the above.
- I have a knack for developing data analysis frameworks, of which, [pyframe](#) has been used by several analyses in ATLAS.
- The ATLAS and CMS experiments at the LHC [discovered the long-sought-after Higgs boson](#), evidence of which was announced on the 4th of July 2012.

## EDUCATION

- **Ph.D. Experimental Particle Physics**, The University of Pennsylvania (Philadelphia, PA), June 2006 - July 2013  
thesis: "[A search for new physics in high-mass ditau events in the ATLAS detector](#)"
- **B.S. Physics with Honors**, The University of Texas (Austin, TX), August 2003 - May 2006  
thesis: "Late pulsing in the Hamamatsu R1408 PMT used in the Sudbury Neutrino Observatory"

## SKILLS

- **General:** data visualization, statistical analysis, data-driven modeling, anomaly detection, neural network classifiers, boosted decision trees, petabyte data reduction, object-oriented design, polymorphic interfaces, writing technical reports, working independently and in groups, presenting my ideas, graduate level physics and mathematics
- **Programming languages (fluent):** [C/C++/STL \(16+ years\)](#), [Python \(10+ years\)](#)
- **Programming languages (experienced):** javascript, SQL; **Markup languages:** [L<sup>A</sup>T<sub>E</sub>X](#), Markdown, (x)html with css
- **Data science software:** matplotlib, numpy, scipy, scikit-learn, pandas, ipython, [Keras](#), [tensorflow](#), [BayesDB](#), AWS, docker, ROOT, RooStats, TMVA
- **General software:** Linux (Redhat/SLC/Ubuntu/Debian), bash, git, svn, UML, QT, Mathematica, Keynote/PowerPoint

Last updated: January 22, 2018