

# Ryan Reece, Ph.D.

Data scientist / machine learning engineer / physicist

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## EXPERIENCE

**Machine Learning Engineer** | Apr 2018 - present

[Cerebras Systems](#), Los Altos, CA

- Stealth-mode startup building high-performance machine learning accelerators
- Developed high-performance, containerized [tensorflow](#) input pipelines with `tf.data`
- Trained benchmark models and did exploratory optimization of various [computer vision](#) and [NLP](#) models (ResNets, seq2seq, GNMT)

**Artificial Intelligence Fellow** | Jan 2018 - Mar 2018

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

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

**Postdoctoral Research Fellow** | Jul 2013 - Aug 2017

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

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

- 10 years (postdoc and a Ph.D.) 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)
- Long involvement in codebase of more than 10 million lines of C++ and almost as many lines of Python
- [Expert in petabyte data reduction](#) (ATLAS ~10 PB/year), world-wide grid computing, and [data visualization](#) as a user and primary supporter of our group's 200-CPU computing cluster, accumulated more than [350k CPU-hours](#)
- Lead analysis groups as "Editor" in two searches for signals of supersymmetry and other exotic decays, [managed a team of 5-6 analysts](#), eventually wrote the research paper, and defended its approval—a period of about a year
- 2015-17, full-time support the operations of the [data acquisition system \(DAQ\)](#) and detector monitoring systems of the SCT (a tracking sub-detector in ATLAS)
- 2017, built more [expertise in machine learning techniques](#), deep learning frameworks, and probabilistic databases: using Keras to build CNNs for particle classification, and another project using BayesDB and sklearn for [anomaly detection](#)

**Graduate Researcher** | Jun 2006 - Jul 2013

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

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

- 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, rotated the [on-call responsibility](#) for the TRT DAQ
- Ph.D. research with the data from ATLAS focused on the identification of decays of tau leptons and their use in searches for new physics, a [pattern recognition](#) problem to identify a type of particle
- 2009-10, was the lead developer of the cut-based tau identification used with the first ATLAS data
- 2010-12, helped develop advanced tau identification using [Boosted Decision Trees \(BDTs\)](#) which superseded the above
- Knack for developing data analysis frameworks: e.g. [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 July 4, 2012 [[arxiv:1207.7214](https://arxiv.org/abs/1207.7214)]

## EDUCATION

- **Ph.D. Experimental Particle Physics**, The University of Pennsylvania (Philadelphia, PA), Jun 2006 - Jul 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), Aug 2003 - May 2006  
thesis: "Late pulsing in the Hamamatsu R1408 PMT used in the Sudbury Neutrino Observatory"

## PUBLICATIONS

- Chiley, V. *et al.* (2019). Online Normalization for Training Neural Networks. [arxiv:1905.05894](https://arxiv.org/abs/1905.05894).
- Albertsson, K. *et al.* (2018). Machine Learning in High Energy Physics Community White Paper. [arxiv:1807.02876](https://arxiv.org/abs/1807.02876).
- As a member of the ATLAS collaboration since June 1, 2008, I am an "author" of more than 800 publications ([inspire](#), [google scholar](#)), however, my list of selected publications is here: [rreece.github.io/publications](https://rreece.github.io/publications)

## SKILLS

- **General:** statistical analysis, data visualization, 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 (17+ years), Python (11+ years);  
(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, jupyter, [Keras](#), [tensorflow](#), [BayesDB](#), AWS (EC2, S3), docker, ROOT, RooStats, TMVA
- **General software:** Linux (Redhat/SLC/Ubuntu/Debian), bash, git, svn, UML, QT, Mathematica
- **Hobbies:** climbing, philosophy, poker, running

Last updated: March 11, 2020