

# Eric Christensen

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# EC

## Objective

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Physicist with heavy focus on data analysis and over one thousand hours of technical public speaking seeking to apply data analytics and machine learning skills to solve challenging and impactful problems.

## Education

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PhD Physics, Virginia Tech, Blacksburg, VA	2009 - 2014
International Neutrino Summer School	2012
BS Mathematics, BS Physics, Virginia Tech, Blacksburg, VA	2006 - 2009

## Skills

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- Programming in linux environments with Python, Java, R, C, shell script, SQL, and Mathematica
- Tensorflow, scikit-learn, and various R machine learning packages
- Regression, classification, mixed models, clustering, Bayesian methods, likelihoods, and chi-squared analysis
- Convolutional neural networks, random forests, support vector machines, and boosted decision trees
- Familiarity with Hadoop and MPI

## Relevant Data Science Experience

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**Convolutional neural networks for iTOP:** Regression followed by subsequent classification for millions of large (512x1024+ pixel) images with only 15 to 40 non-zero entries each. I spearheaded the project for a collaboration of around 700 people. The project involved:

- Programming C, shell, and MPI for Monte Carlo simulation
- Tensorflow and sci-kit learn libraries for python
- Convolutional neural networks and stochastic gradient descent
- Data visualization
- High performance computing

**B to Ds\*  $\pi$ :** Signal selection amongst a large background. Signal rates are used to put constraints on physics models. The project involved:

- Programming in R
- Sequential random forests for cut selection
- Signal processing
- Data visualization

**Reactor neutrino sensitivities:** Simulated event rates from the nuclear reactors in Iran and North Korea for neutrino detectors. Used event rates to determine sensitivities to nuclear composition. The project involved:

- Remote detection
- Programming in C and Mathematica
- Chi-squared analysis
- Data visualization
- Real world application of fundamental physics



## Employment

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### Physics Faculty – KSU, Kennesaw, GA

August 2014 – Present

Physics instructor for algebra-based introductory physics sequence and corresponding labs. (Fall 2014 – Present).

### Visiting Faculty – Pacific NW National Lab, Richland, WA

Summer 2016

### Research Assistant – Virginia Tech, Blacksburg, VA

2010 - 2014

Research focused on nuclear reactor based neutrino experiments, including fundamental research about neutrinos and applications towards understanding nuclear physics and nuclear non-proliferation.

### Teaching Assistant – Virginia Tech, Blacksburg, VA

2009 - 2014

Lectured for two graduate quantum mechanics classes that covered hydrogen atom perturbations and spin-orbit coupling. (Spring 2014)

Recitation and classroom assistant for freshman physics class. (Spring 2013 - Spring 2014) Electricity and Magnetism grader. Lectured for two classes on dielectrics. (Fall 2012)

Lectured for six graduate quantum mechanics classes that covered angular momentum, perturbation theory, and the Dirac equation. (Spring 2012)

Lectured for six electricity and magnetism classes on electrostatics and magnetostatics. (Fall 2011) Junior physics lab teaching assistant. Assisted students in building a class D amplifier. (Spring 2011) Senior physics lab teaching assistant. Covered many radioactive decay topics. (Fall 2010)

Physics major common office hour tutor for all physics classes. (Fall 2009 - Spring 2010)

## Publications

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### "Antineutrino Monitoring for the Iranian Heavy Water Reactor"

2014

E. Christensen, P. Huber, P. Jaffke, T. Shea. <http://www.2physics.com/2014/11/antineutrino-monitoring-for-iranian.html>

### "Antineutrino Monitoring for Heavy Water Reactors"

2014

E. Christensen, P. Huber, P. Jaffke, and T. Shea. Phys. Rev. Lett. 113, 042503.

### "Antineutrino reactor safeguards - a case study"

2013

E. Christensen, P. Huber, and P. Jaffke. arXiv:1312.1959.

### "Physics Performance of a Low-Luminosity Low Energy Neutrino Factory"

2013

E. Christensen, P. Coloma, and P. Huber. Phys. Rev. Lett. 111, 061803.

### "Experimental and modeling study of pulsed optically simulated luminescence in quartz, marble and beta irradiated salt."

2009

V. Pagonis, S. M. Mian, M. L. Chithambo, E. Christensen, and C. Barnold. J. Phys. D: Appl. Phys. 42.



## Scholarships and Awards

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Award for Graduate Teaching Assistant Excellence	2010
William E. Hassinger Graduate Fellowship	2010
T W Hatcher Scholarship	2008 - 2009
DC&DE Grant	2008 - 2009
Virginia Tech Putnam Award	2007
Virginia Tech Regional Mathematics Contest Award	2006

## Presentations and Posters

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<b>Los Alamos National Labs (LANL) Colloquium</b> "Antineutrino Safeguards" (Presentation)	Spring 2014
<b>International Neutrino Summer School</b> "Search For Sterile Neutrinos From Reactor Sources" (Presentation) "Higgs Factory" (Presentation)	Summer 2012
<b>Sterile Neutrinos at a Crossroads</b> "Impact of Flux Models on Reactor Measurements of $\theta_{13}$ " (Poster)	Fall 2011
<b>Phenomenology 2011 Symposium</b> "Impact of Flux Model Choice on Reactor Experiments" (Presentation)	Spring 2011