Douglas Davis

Brief CV

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Education

- **PhD in Physics** August 2014 – present

  Duke University, Durham, NC, USA

  - Research Area: Experimental elementary particle/high energy physics.
  - Candidacy status as of April 2017

- **BS in Physics** Graduated May 2014

  The University of Texas at Austin, Austin, TX, USA

  - Thesis title: *A Monte Carlo study of the NuMI Neutrino Beam in the MicroBooNE Detector.*

Research Experience

- **ATLAS Experiment at the Large Hadron Collider** Summer 2015 - present

  Duke University & CERN

  - ATLAS is a massive detector on the Large Hadron Collider which analyzes the collisions of very high energy protons.
  - In the Top Physics Working Group: I participate on the analysis of the production of a top quark in association with a W boson from proton-proton collisions in the dilepton final state. I write analysis software to process large datasets and run statistical tests.
  - In the Transition Radiation Tracker (TRT) software group: I am currently the deputy coordinator of the TRT SW group; I started this role in September 2017. I develop and maintain an API for TRT projects to analyze ATLAS datasets. I am also the leader of the particle identification subgroup; I started this role in February 2017. I oversee all ongoing projects related to particle identification (e.g. calibrating existing tools) and participate in researching alternative methods to improve particle discrimination. I completed by ATLAS authorship qualification in the TRT SW group, where I implemented gas type emulation into TRT simulation software. The TRT is a straw tube detector with an active gas that is ionized as charged particles pass through; gas type emulation makes it faster to test alternative TRT gas type geometries.

- **MicroBooNE Experiment** June 2013 - June 2014

  The University of Texas at Austin & Fermilab

  - MicroBooNE is an experiment exposed to the Booster neutrino beam, but Fermilab also operated another neutrino beam, NuMI, which is off axis with respect to the MicroBooNE detector (the beamline is at an angle with respect to the location of MicroBooNE). I wrote my undergraduate thesis on the study of the NuMI beam in the MicroBooNE detector by simulating the NuMI beam through MicroBooNE to estimate the flux of neutrinos through the detector.

- **UTμT Detector** November 2011 - June 2014

  The University of Texas at Austin

  - Cosmic ray muons are very abundant on the surface of the earth. Muon detectors are useful for vetoing background in sensitive materials that are being tested while exposed to muons. I contributed to the construction and software development for a 1024 channel plastic scintillator based muon detector.

- **Department of Energy Undergraduate Research Internship** June 2013 - August 2013

  Fermilab

  - Fermilab has a long a complex accelerator chain. Protons begin in the linear accelerator (LINAC) before moving on to more energetic accelerators. All along the chain, the beam must be monitored. I recommissioned a a Feschenko Bunch Shape Monitor in the Fermilab Linear Accelerator for monitoring the LINAC bunch profile.

- **Freshman Research Initiative** January 2011 - December 2011

  The University of Texas at Austin

  - The Freshman Research Initiative in the UT Austin College of Natural Sciences paired undergraduates with participating laboratories for early-undergraduate projects. I worked in a materials science lab, where I learned to synthesize and analyze the type-II superconductor holmium barium copper oxide.

Publications, Talks, Posters

Publications

- ATLAS Collaboration Author – as a qualified author I am listed on all ATLAS publications. February 2017 – present.

Talks

- TRT Developments for High Luminosity Conditions in 2017 and Beyond. *US ATLAS Week, Argonne*, July 2017.
- Measuring Longitudinal Bunch Shape in the Fermilab Linear Accelerator with a Feschenko Bunch Shape Monitor. *Fermilab Undergraduate Seminar Series*, August 2013.
- Summary of Construction and Software Development for a Cosmic Ray Muon Telescope at UT Austin. *Department of Energy Site Visit, UT Austin*, February 2013.

Posters

- ATLAS TRT Software Developments and PID Performance for Run II. 2016 ATLAS Overview Week in NYC.
- The MicroBooNE Experiment & its Unique Exposure to two Neutrino Beams, Fall 2014 UT Physics Dept. Open House.
- Cosmic Ray Muon Tracking Telescope, Fall 2014 UT Physics Dept. Open House.
- Construction, Monte Carlo Simulations, and Event Reconstruction for a Cosmic Ray Muon Telescope. Spring 2013 UT Physics Dept. Open House.

Teaching

- Teaching Assistant, PHY 134 (Introduction to Astronomy) – Spring 2016, Duke University.
- Teaching Assistant, PHY 264L (Modern Physics Laboratory) – Fall 2015, Duke University.
- Undergraduate teaching assistant, Spring & Fall 2012, The University of Texas at Austin.

Mentoring, Outreach

- North Carolina Science Festival, State-wide Star Party, April 2016.
- Physics Dept. peer mentor, Fall 2012, The University of Texas at Austin.

Computing

- Proficient Programming: C++, Python, LaTeX typesetting.
- Proficient Scientific Software: The SciPy Stack (numpy, scipy, matplotlib, pandas, etc.), scikit-learn
- Particle Physics Software: (Py)ROOT, GEANT4, HistFactory (other ATLAS Experiment specific frameworks).
- General/Environments/Operating Systems: Unix & Unix-like (Linux, macOS), git, CMake, C++ STL.

Honors and Awards

- Duke University Goshaw Fellow 2014 – 2015 Academic Year.