Tyler James Burch

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Research Interests: Experimental high-energy collider physics, Higgs boson physics, trigger and data acquisition systems, high performance photon identification, machine learning applications in HEP

Education

Aug 2014 - Present **Northern Illinois University**, DeKalb, Illinois
Physics Ph.D. candidate

Advised by Jahred A. Adelman

Aug 2011 - May 2014 **Murray State University**, Murray, Kentucky
Bachelor of Science in Physics (*Cum Laude*)
Minors: Mathematics, Music

Research Experience

August 2015 - Present **Northern Illinois University**
ATLAS Experiment

Thesis: *"A search for resonant and non-resonant di-Higgs production in the $\gamma\gamma b\bar{b}$ channel using the ATLAS Detector"*

- Main analyzer on a search for di-Higgs production decaying to the $\gamma\gamma b\bar{b}$ final state, thesis will utilize the full Run 2 data set collected from 2015 through 2018
- Analysis probes both Standard Model (SM) di-Higgs production as well as enhanced production due to physics beyond the SM
- Thesis will focus on utilizing a Multivariate Analysis for optimization, and a dedicated category targeting Vector Boson Fusion topologies
- Participated in search using 2015 and 2016 data. Published July 2018.

ATLAS FastTracKer (FTK) Upgrade

- Offline software - comparing simulated performance to offline, served as authorship qualification project (August 2015 - June 2017; qualified January 2017)
- Online software and day-to-day operations, specifically focused on operation of the Input Mezzanine Card (March 2017 - present)
- System commissioning in 2017-2018, involved in installation, testing, and scaling of massively parallel system.

ATLAS Photon Identification Group

- Optimization studies focusing on using topological clusters and MVA techniques (August 2018 - Present)

Service work:

- Responsible for running validation on Monte Carlo for the HGamma subgroup and maintaining webpage containing validation information
- Frequent on-call shifter for the FTK subsystem (2017 - 2018)
- Run Control shifts in the ATLAS control room (2017)

MAY 2015 - AUGUST 2015 **Northern Illinois University**
Mu2e

Investigated radiation effects on performance of silicon photomultipliers (SiPM) for use in the Mu2e experiment
Supervised by Vishnu Zutshi

PUBLICATIONS

188 publications as a member of the **ATLAS Collaboration**, January 2017 to present (SPIRES)

TALKS

Photon Identification Optimization, Tests on Data, and MVA Perspectives ATLAS e/γ Workshop. Sheffield, England. January 29, 2019.

Why Do We Care About Looking for di-Higgs Production? 2018 US LHC Users Association Meeting. Fermilab, Batavia, Illinois. October 25, 2018.

Vector Boson Fusion di-Higgs Generation and Benchmarks Double Higgs Production at Colliders Workshop. Fermilab, Batavia, Illinois. September 7, 2018.

POSTERS

T.J. Burch, "**Online Software in the ATLAS FastTracKer System**". Poster Session, ATLAS Collaboration Week, Bratislava. October 9, 2017.

SCHOLARSHIPS AND AWARDS

SEPTEMBER 2018 - AUGUST 2019 **DOE Office of Science Graduate Student Research (SCGSR) Award Recipient**
Research Project: *"Utilizing Machine Learning Classifiers for Photon Identification"*

Conducted at Argonne National Laboratory with collaborating DOE laboratory scientist Dr. Taylor Childers

CONFERENCES, WORKSHOPS, SCHOOLS

Oct 24 - 26, 2018 **2018 US LHC Users Association Meeting** Fermilab, Batavia, Illinois.
Apr 9 - 12, 2018 **2nd Inter-experimental Machine Learning Workshop**, CERN, Geneva, Switzerland.
Feb 14 - 22, 2018 **International School of Trigger and Data Acquisition (ISOTDAQ)**, Vienna, Austria.
Nov 13 - 16, 2017 **DBL/HBSM Joint Workshop**, LAPP, Annecy, France.
Oct 8 - 13, 2017 **ATLAS Collaboration Week**, Bratislava, Slovakia.
Oct 6 - 8, 2016 **Fall Meeting of the APS Prairie Section**, Northern Illinois University, DeKalb, Illinois.
Nov 11 - 13, 2015 **2015 US LHC Users Association Meeting** Fermilab, Batavia, Illinois.

Teaching and Outreach

2014 - 2017

- **STEMfest Volunteer**, Northern Illinois University. Oct 8, 2016.
- **QuarkNet Volunteer Instructor**, Northern Illinois University. June 6-10, 2016.
- **Graduate Colloquium Chair**, Northern Illinois University. Aug 2015 - Dec 2016. Invited 2-3 speakers to NIU each semester on behalf of the physics graduate students through university's Graduate Colloquium Program. Oversaw speaker selection and coordination of visits
- **Graduate Teaching Assistant**, Northern Illinois University. Fall 2014 - Spring 2015. Instructed labs for Phys 210 (Fall 2014; supervised by Prof. Lyle Marschand) and Phys 253 (Spring 2015; supervised by Prof. Dennis Brown)

2012 - 2014

- **Undergraduate Teaching Assistant**, Murray State University. Graded for an introductory C++ class (Fall 2012; supervised by Prof. James Hereford). Instructed various general physics labs (Spring 2013 - Spring 2014)

Computer Skills

Programming:	C++, ROOT, Python, MATLAB, LaTeX
Operating Systems:	Linux, Windows, macOS
Gitlab and Github:	@tjburch