

Baojia(Tony) Tong

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Education

Harvard University, Massachusetts, MA

Ph.D., Physics, 2018

M.A., Physics, 2014

Thesis: Search for di-Higgs decay to $b\bar{b}b\bar{b}$ at ATLAS

Committee: Profs. Melissa Franklin (Adviser), Masahiro Morii, Howard Georgi

California Institute of Technology, California, CA

B.A. with honors, Physics, 2012

Research Experience

Harvard University

Class Projects in Machine Learning: CS181 and CS281 at Harvard	2017
Analyzer, $W^\pm W^\pm W^\mp$ search using ATLAS 13TeV data	2017-present
Analyzer, $X \rightarrow$ boosted di-Higgs $\rightarrow b\bar{b}b\bar{b}$ using ATLAS 13TeV data	2015-present
Developer, Improvement of Segment Seeding in Muon Reconstruction	2015-2016
Developer, Offline Data Quality Software for Muon Reconstruction	2015-2016
Expert and organizer, Offline Muon Data Quality Monitoring	2015
Analyzer, Prospective study of $HH \rightarrow WW\tau\tau$ for High Lumi LHC	2014
Calibration of Prototype Micromegas Chambers at Harvard	2014
Study of Muon Segments in ATLAS detector using 8TeV data	2012-2013

California Institute of Technology

Study of W/Z + jets using CMS 8TeV data	2011-2012
Design and validation of an optical sensor for telescopes	2009-2010
Experiment design and study of market convergence	2009-2010
Modeling on novel methods of space launching	2008-2009

Detailed Research Contributions

Analysis

Search for $W^\pm W^\pm W^\mp$ using ATLAS 13TeV data

- Develop analysis framework for three lepton channel
- Optimize analysis selection using machine learning techniques

Search for $X \rightarrow$ boosted double Higgs $\rightarrow b\bar{b}b\bar{b}$ using ATLAS 13TeV data

- Design signal regions and validation regions
- Improve search sensitivities, especially for high mass signals
- Develop data-driven background estimation and reweighting methods
- Validate signal MC simulations and maintain software framework
- Evaluate systematics for detector responses and data-driven methods
- Calculate asymptotic exclusion limits
- Add analysis veto for statistical combination
- Draft supporting documents, produce event displays

Prospective study of double Higgs $\rightarrow WW\tau\tau$ for the HL-LHC

- Design signal regions and event selections, apply smearing on simulations
- Test multivariate analysis methods to increase signal sensitivities
- Predict cut-based and multivariate analysis combined significances

Hardware

Prototype Micromegas Chamber Tests

- Calibrate charge and timing of prototype chambers
- Assist cosmic muon data taking
- Analyze and measure cosmic muon charge and timing distributions

Software

Muon Reconstruction

- Create parabolic road extrapolation for raw hits selection
- Improve Muon reconstruction efficiency and reduce fake rate

Muon Monitoring

- Develop, update, and maintain Muon Performance Monitoring packages
- Design and develop offline Muon Performance Monitoring Displays
- Improve and develop offline Muon Detector and Performance Monitoring algorithms
- Maintain Muon Performance Monitoring packages for prompt online monitoring

Operation

Muon Data Quality

- Organise weekly meetings on offline software updates and data quality status
- Coordinate offline Muon Detector Monitoring software updates
- Create offline shifter training materials and instructions, webpages for offline shifter records

Shifts

- Conduct online ATLAS Control Room Shifts: Muon Desk, Data Quality Desk
- Conduct offline Muon Data Quality Shifter and Expert Shifts: serve as on-call expert

Selected Publications and Talks (with links)

Full citations with all publications: [380 papers](#) and [20000 citations](#).

Selected Paper

Search for pair production of Higgs bosons using 36 fb^{-1}	2017
Search for heavy resonances decaying to a W/Z and a Higgs boson at ATLAS	2017
Search for pair production of Higgs bosons in the $b\bar{b}b\bar{b}$ final state at ATLAS	2016

Selected Public Notes

ATLAS-CONF-2016-049 , $HH \rightarrow b\bar{b}b\bar{b}$, ATLAS 13TeV, 13 fb^{-1}	2016 summer
ATLAS-CONF-2016-083 , $VH \rightarrow q\bar{q}b\bar{b}$, ATLAS 13TeV, 13 fb^{-1}	2016 summer
ATLAS-CONF-2016-017 , $HH \rightarrow b\bar{b}b\bar{b}$, ATLAS 13TeV, 3 fb^{-1}	2016 spring

Conference Talk/Seminars

A Tale of Two Higgs, Particle Physics Seminar, University of Kansas	2018
A Tale of Two Higgs, Particle Physics Seminar, BrookHaven National Laboratory	2017
Search for di-Higgs to $b\bar{b}b\bar{b}$ final state with ATLAS , DPF, Fermilab	2017
Search for di-Higgs production with ATLAS , Higgs Couplings, SLAC	2016
ATLAS $HH \rightarrow b\bar{b}b\bar{b}$ ICHEP Results , Higgs Boson and BSM, Weihai, China	2016

Teaching Experience

Physics Department, Harvard University

Teaching Fellow, Physical Science 12, Electromagnetism, Qscore 4.55/5	2017
Guided summer student Gray Putnam's research	2016
Guided summer student Michael Albergo's research	2015
Teaching Fellow, Physics 125, Widely Applied Physics, Qscore 4.33/5	2014
Teaching Fellow, Physics 16, Classical Mechanics and Relativity, Qscore 4.47/5	2013

Physics Department, California Institute of Technology

Teaching Assistant, Physics 50, Physics League	2011-2012
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Honors

Harvard White Teaching Prize for Physics 16	2014
Harvard Traveling Scholar	2015-2016
Caltech Undergrad Summer Research Fellowship	2009-2012