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

Honors

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