

# Baojia(Tony) Tong

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## Education

**Harvard University**, Massachusetts, MA

Ph.D., Physics, expected May 2017

M.A., Physics, 2014

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

**California Institute of Technology**, California, CA

B.A. with honors, Physics, 2012

## Research Interests

Searches for new physics models with the Higgs Boson

Di-boson production and measurement at TeV scale

Charged particle prompt reconstruction

Detector operation, monitoring and upgrade development

## Research Experience

### Harvard University

Analyzer, $X \rightarrow$ boosted $hh \rightarrow b\bar{b}b\bar{b}$ using ATLAS 13TeV data	2015-2016
Developer, Improvement of Segment Seeding in Muon Reconstruction	2015-2016
Co-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 Vector Boson + Jets using CMS 8TeV data	2011-2012
Design and validation of an optical sensor for telescopes	2009-2010
Design experiment and study of market convergence	2009-2010
Modeling on novel methods of space launching	2008-2009

## Detailed Research Contributions

### Analysis

#### **Search for $X \rightarrow$ boosted $hh \rightarrow b\bar{b}b\bar{b}$ using ATLAS 13TeV data**

- Devised signal regions, improved search sensitivities
- Revised data-driven background estimation methods
- Validated signal MC simulations
- Updated software framework, produced analysis NTuples
- Selected and validated analysis trigger, optimized event selection
- Evaluated systematics for detector responses and data-driven methods
- Calculated asymptotic exclusion limits
- Drafted supporting documents, produced event displays

#### **Prospective study of $hh \rightarrow WW\tau\tau$ for High Lumi LHC**

- Designed signal regions and event selections
- Tested multivariate analysis methods and increased signal sensitivities
- Predicted cut-based and multivariate analysis combined significances

### Hardware

#### **Prototype Micromegas Tests**

- Calibrated charge and timing of prototype chambers
- Assisted cosmic muon data taking
- Analyzed and measured cosmic muon charge and timing distributions

### Software

#### **Muon Reconstruction**

- Created parabolic road extrapolation for raw Muon detector hits selection
- Resolved previous bugs in road extrapolation

#### **Muon Monitoring**

- Developed, updated and maintained Muon Performance Monitoring packages
- Designed and maintained offline Muon Performance Monitoring Displays
- Improved and maintained offline Muon Detector and Performance Monitoring Algorithms
- Maintained Muon Performance Monitoring packages for prompt online Monitoring

### Operation

#### **Muon Data Quality**

- Organized weekly meetings on offline software updates and data quality status
- Coordinated offline Muon Detector Monitoring software updates
- Created offline shifter training materials and instructions
- Created webpages for offline shifter records
- Communicated between detector and performance experts

#### **Shifts**

- Participated online ATLAS Control Room Shifts: Muon Desk, Data Quality Desk
- Participated offline Muon Data Quality Shifts: sign-offs
- Participated offline Expert Shifts: assisted the shifters for offline Muon Data Quality

## Publications and Talks (with links)

### Paper

[Search for pair production of Higgs bosons in the  \$b\bar{b}b\bar{b}\$  final state at ATLAS](#) 2016

### Public Notes

[ATLAS-CONF-2016-049](#),  $hh \rightarrow 4b$ , ATLAS 13TeV,  $13fb^{-1}$  2016 summer  
[ATLAS-CONF-2016-083](#),  $vh \rightarrow qqbb$ , ATLAS 13TeV,  $13fb^{-1}$  2016 summer  
[ATLAS-CONF-2016-017](#),  $hh \rightarrow 4b$ , ATLAS 13TeV,  $3fb^{-1}$  2016 spring

### Public Talks

[ATLAS  \$hh \rightarrow 4b\$  ICHEP Results](#), Higgs Boson and BSM, Weihai, China 2016

### Selected ATLAS Talks

[hh  \$\rightarrow\$  4b](#), analysis ICHEP ATLAS Approval 2016  
[hh  \$\rightarrow\$  4b](#), analysis ICHEP Exotics Approval 2016  
[hh  \$\rightarrow\$  4b/bb \$\tau\tau\$ /bbWW](#), Exotics Workshop, Grenoble 2016  
[Muon Segment Seeding](#), Muon Week, Software 2016  
[Muon Hough Transform Tuning](#), Muon Week, Software 2015  
[Muon Spectrometer and DQ Status](#), ATLAS Weekly 2015  
[Muon DQ 2015 Summary](#), Muon Week, Operations 2015  
[Muon DQ Pre Run II Status](#), Muon Week, Operations 2015  
[Muon DQ Shifter Manual](#) 2015

## Teaching Experience

### Physics Department, Harvard University

Guided undergraduate student Gray Putnam's summer research 2016  
Guided undergraduate student Michael Albergo's summer 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

## Languages and Skills

Chinese (native), English (proficient), French (elementary)  
C++, HTML, L<sup>A</sup>T<sub>E</sub>X, Matlab, Mathematica, Python, ROOT

## References

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