

Shuo Han

Curriculum Vitae

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Personal information

Date Of Birth: 21.06.1991; Nationality: China.

Education

- Sept. 2014 - **Ph.D in Particle Physics**, *Institute of High Energy Physics(IHEP), Chinese Academy of Science (CAS), Beijing, China.*
Jun. 2019
Supervisor: Prof. Shan Jin, Vice-supervisor: Prof. Yanping Huang, Co-advisor: Prof. Kerstin Tackmann
- Jan. 2017 - **International Ph.D student of China Scholarship Council (CSC)**, *Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany.*
Jan. 2019
- Sept. 2010 - **Bachelor of Science in Physics**, *Central China Normal University (CCNU), Wuhan, China.*
Jun. 2014
- Sept. 2007 - **High School**, *Jinan, Shandong, China.*
Jun. 2010

Work experience

- Dec. 2019 - **Postdoctoral Scholar**, *Lawrence Berkeley National Laboratory(LBNL), CERN,Switzerland and Berkeley,US.*
now
○ Work as a member of the LBNL ATLAS group on physics analysis.
- July. 2019 - **Guest Scholar**, *Institute of High Energy Physics(IHEP), Chinese Academy of Science (CAS), Beijing, China.*
Oct. 2019
○ Work as a member of the IHEP ATLAS group on physics analysis.
- Aug. 2015 - **Ph.D student and Research Assistant**, *Institute of High Energy Physics(IHEP), Chinese Academy of Science (CAS), Beijing, China.*
July. 2019
○ Physics analysis and performance measurements with $\sqrt{s} = 13$ TeV ATLAS Run2 data, as a member of IHEP ATLAS group.
- Photon identification efficiency measurement on ATLAS.
- Search for Higgs $\rightarrow Z\gamma$, or a high-mass resonance decay into $Z\gamma$.
- Measurement on the fiducial / differential cross-section of Higgs $\rightarrow \gamma\gamma$.
- Search for ttH production in multi-lepton final states.
- Feb. 2014 - **Undergraduate in Beijing Spectrometer (BES III) experiment**, *Institute of High Energy Physics(IHEP), Chinese Academy of Science (CAS), Beijing, China.*
Jun. 2014
○ Measurement on the branching ratio of $J/\psi \rightarrow p\bar{p} \pi^+\pi^-$, updated the result with the data taken in 2012, and complete the thesis of Bachelor's degree with this study.

Languages & Skills

Languages	English (Fluent), Chinese (Proficient), German (Very Basic)
Office/OS	L ^A T _E X, Markdown, Excel, Keynote; Linux
Programming languages	C/C++, Python, Bash, Javascript
Data Analysis	ROOT (CERN)
Monte Carlo Generators	Sherpa, MG5_aMC@NLO

Awards

- May. 2019 Chief Award of Chinese Academic of Science (CAS)
- Dec. 2018 Chief Award of Institute of High Energy Physics (IHEP), Chinese Academy of Science
- Nov. 2018 China National Scholarship for PhD. students
- June. 2014 Outstanding Bachelor's thesis award of Hubei Province (China)

Summer Schools/Activities

- Oct. 2018 DESY 1st Terascale School of Machine Learning
- Feb. 2018 DESY Terascale Statistics School
- Aug. 2017 - CERN-Fermilab HCP Summer School
- Sept. 2017
- Aug. 2015 - DESY Summer School Program
- Oct. 2015
- Sept. 2012 - Captain of the (Chinese) debating team in the Physics School, CCNU
- June. 2014

Publications

- [1] Measurement of the photon identification efficiencies with the ATLAS detector using LHC Run 2 data collected in 2015 and 2016 [J] Eur. Phys. J. C 79 (2019) 205
- [2] Measurements of Higgs boson properties in the diphoton decay channel with 36 fb^{-1} of pp collision data at $\sqrt{s}=13$ TeV with the ATLAS detector [J] Phys. Rev. D 98 (2018) 052005
- [3] Search for new phenomena in high-mass diphoton final states using 37 fb^{-1} of proton-proton collisions collected at $\sqrt{s}=13$ TeV with the ATLAS detector [J] Phys. Lett. B 775 (2017) 105
- [4] Searches for the $Z\gamma$ decay mode of the Higgs boson and for new high-mass resonances in pp collisions at $\sqrt{s}=13$ TeV with the ATLAS detector [J] JHEP 10 (2017) 112
- [5] Search for heavy resonances decaying to a Z boson and a photon in pp collisions at $\sqrt{s}=13$ TeV with the ATLAS detector [J] Phys. Lett. B 764 (2017) 11

Statement of research interest

I have been mainly working on the detector performance (photon identification / reconstruction performance) and physics analysis ($Z\gamma$, di-photon final states, $t\bar{t}H \rightarrow \text{multi-leptons}$ and $HH \rightarrow b\bar{b}\gamma\gamma$) in the ATLAS experiment since 2015, and have been a qualified author of the ATLAS collaboration since Aug. 2016

Since Higgs Boson found in 2012, the most important task of ATLAS experiment is to measure Higgs properties and search for new physics. For physics analysis, I mainly worked in $Z\gamma$, di-photon, $t\bar{t}H \rightarrow \text{multi-leptons}$ and $HH \rightarrow b\bar{b}\gamma\gamma$ analysis, these 4 channels already cover both standard model (SM) rare decay search, new physics search and the measurement on the SM parameters; and they already cover most of the technical knowledge of ATLAS physics analysis. I mainly focused in $Z\gamma$ final state and practiced the whole chain of the physics analysis [<https://arxiv.org/abs/1708.00212>]. This experience brings me an overview of the work-flow and challenges of physics analysis one can meet. I gave countable ATLAS editorial board meeting presentations and ATLAS approval talks in the $Z\gamma$ channel, took responsibilities in $t\bar{t}H \rightarrow \text{multi-leptons}$ search and the Higgs fiducial/differential cross-section measurement, and stepped into $HH \rightarrow b\bar{b}\gamma\gamma$ analysis in 2019. The full Run2 analysis of ATLAS will give more accurate measurements on Higgs properties and more possibility to find new physics with more statistic amount. And there are more and more conversations between performance and analysis groups with a higher-pileup environment. I'm looking forward to keep the roles I've taken in these data analysis teams, and working on topics I haven't done like the effective theory parameter measurement, Higgs coupling measurement, and di-Higgs search.

Photon detector performance studies is the essential task for photon-related analysis. Where I finish my ATLAS qualification task in 2016 on the measurement of photon identification efficiency [ATL-PHYS-PUB-2016-014]. I was trained with the basic software/data analysis knowledge at that time. After the qualification task I continue to develop a method of electron fake to photon rate measurement by directly using the Zee tag-and-probe selection. I also studied on the phenomenon of conversion photon fake to electron (specifically in $t\bar{t}H \rightarrow \text{multi-leptons}$ analysis), and the conversion photon reconstruction's high-pileup performance. These topics are very meaningful for both the detector performance and particular physics analysis. I'm very interested to continue those studies with deeper thoughts of ATLAS performance and software.

Besides the physics analysis and the detector performance studies, it's vital to know how the detector is developed and setup, and how the digital signals was reconstructed as physics objects. I also got the chances to be trained with the hardware knowledge with the operation of DESY Test-beam to test the silicon sensors. And in 2019, I'm also learning with the phase-2 upgrade of the ATLAS strip sensor in the IHEP. I am looking for a chance to extend my knowledge beyond the Performance/Analysis. This will inspire me with totally new thoughts of the High Energy Physics experiments. According to the knowledge I got from the trainings I had, I'm surely able to make contributions to the hardware tasks in a 2-year or even longer post-doctor project.

In July 2019, I defended my thesis and obtained Ph.D degree in Particle Physics from the Institute of High Energy Physics (IHEP), Chinese Academy of Science (CAS). I'm now an academic guest in the IHEP with a temporary contract.

In general, I'm well trained in physics analysis and detector performance studies. I'm looking for a

chance to do hardware studies in the ATLAS experiment. I'll accept and try my best to overcome the new challenges in the future.