

Lingshan Xu

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Skills

Programming: C++ (advanced), python (proficient), BASH shell script (proficient), Matlab (intermediate)

Tools: Vim, Visual Studio, Hadoop

Software: root, Monte Carlo models (Hijing, AMPT and Pythia)

Knowledge: Data analysis, algorithms (EE 580), statistics (STAT 512), machine learning (decision tree, regression, neural network etc.)

Education

Purdue University, West Lafayette, IN, US 08.2009-present

- PhD in heavy ion physics with CMS experiment
- Andrews fellowship 2009 (A 4-year fellowship given to 1-2 PhD students in physics department)

Zhejiang University, China 09.2005-07.2009

- Bachelor's Degree in Science, Majored in Physics

Experience

Research Assistant at Purdue University and CMS (Compact Muon Solenoid) collaboration 02.2012-present

- Collaborated within a large scientific community, CMS (Compact Muon Solenoid) experiment with over 3200 physicists (<http://cms.web.cern.ch/tags/heavy-ions>).
- Implemented several libraries of the CMS official packages with C++ and Python. Such as centrality package of the data visualization system (DQM GUI) and the rapidity boost plugin of the generator library. (<https://github.com/satan1028>)
- Produced Monte Carlo simulation data of pPb and PbPb collisions with C++, python, and FORTRAN on large scale computing grid for the “ridge” phenomenon study.
- Developed new data analysis code with C++ and python to extract important information from large scale (~200T) experimental data as well as the Monte Carlo data. Such as collective flow and medium modification in Quark Gluon Plasma (QGP) and small collision systems.
- Synthesized and presented results to the CMS heavy ion team and at international conference (Quark Matter 2014: <http://www.sciencedirect.com/science/article/pii/S0375947414005144>).
- Traveled to CERN, Geneva to monitor and report the trigger performance of the CMS detector during data collection period.

Projects

Away-side jet modification study in PbPb collisions for CMS 12.2014-present

- Established a new model with C++ to extract away-side jet from dihadron correlation functions.

Pseudorapidity dependence of “ridge” in pPb collision for CMS 05.2013-present

- Led the new analysis of pseudorapidity dependence for the “ridge” phenomenon. Developed a new method using C++ and python with regression analysis (goodness of fit) to build a model that describes and decompose “ridge” and “jet” from two-particle correlation.

Two- and Four-particle correlation in pPb collisions for CMS 01.2013-05.2013

- Collaborated with heavy ion group members and completed the HF (Hardon Forward Calorimeter) dependence and charge dependence dihadron correlation study with C++ and python for the “ridge” phenomenon in pPb collisions. (<http://phys.org/news/2013-06-phenomena-cms-exotic-state.html>)

Long-range “ridge” phenomenon in pPb collisions for CMS	09.2012-11.2012
<ul style="list-style-type: none"> First “ridge” phenomenon discovered in pPb collisions. Achieved the dihadron correlation study in multiple Monte Carlo models. (http://cerncourier.com/cws/article/cern/52020) 	
Monte Carlo simulation study in pPb and PbPb for CMS	02.2012-11.2012
<ul style="list-style-type: none"> Produced large scale Monte Carlo samples using multiple simulation models: AMPT and Hijing etc. Studied the simulation models in preparation of the 2012 and 2013 pPb collision run. 	
Model-independent decomposition of flow and non-flow in heavy ion collisions	01.2012-04.2012
<ul style="list-style-type: none"> Developed a new method to decompose flow and non-flow. Applied the method with C++ to multiple Monte Carlo models. 	
Mach cone search using dihadron Correlation technique in Relativistic Heavy Ion Collider	07.2011-12.2011
Muon Reconstruction algorithms Study in CMS	01.2011-05.2011

Publications

- **Lingshan Xu** for the CMS Collaboration, Pseudorapidity dependence of long-range two-particle correlations in pPb collisions at 5.02 TeV with CMS, Nuclear Physics A, Volume 931, Pages 1012–1016, November 2014
- CMS collaboration, Multiplicity and transverse momentum dependence of two- and four-particle correlations in pPb and PbPb collisions, Phys. Lett. B 724 (2013) 213
- **Lingshan Xu** et al, Event mixing does not reproduce single particle acceptance convolutions for nonuniform pseudorapidity distributions, Phys. Rev. C 88, 064907 (2013)
- CMS collaboration, Observation of long-range, near-side angular correlation in pPb collisions at LHC Phys. Lett. B 718 (2013) 795
- **Lingshan Xu** et al., Model-independent decomposition of flow and nonflow in relativistic heavy-ion collisions. Phys. Rev. C 86, 024910 (2012).