Curriculum Vitae
Hang Yin

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Positions Held

Research Associate at Fermilab (2010 - Present)

Convener of Electroweak physics group at DØ (2011 - 2014)

Convener of Calorimeter Calibration group at DØ (2011 - 2012)

Education

Ph.D. Physics, 2010
University of Science and Technology of China (USTC), Hefei, Anhui 230026, P.R. China
Thesis: Measurement of the Forward-Backward Charge Asymmetry (A_{FB}) in $p\bar{p} \to Z/\gamma^* \to e^+e^-$ events at $\sqrt{s} = 1.96$ TeV
Advisor: Professor Liang Han

B.S. Physics, 2005
Shandong Normal University (SDNU), Jinan, Shandong, 250014, P.R. China

Research Experience

- **Measurement of the W boson Charge Asymmetry in the electron channel at DØ (2011 - Present)**
  - The W boson charge asymmetry provides constraints on the ratio of $u-$ and $d-$ quark parton distribution functions (PDFs). PDFs are necessary inputs for cross section calculations at hadron colliders. Many measurements have significant uncertainties associated with the accuracy of the PDFs, therefore understanding PDFs is extremely important. Previously, DØ only measured the lepton charge asymmetry using W boson events. With the full data-set of Tevatron Run II, I measured both the W boson and lepton charge asymmetry measurements. These results are the most precise measurements of the W boson charge asymmetry and lepton charge asymmetry to date. The W boson charge asymmetry has been published in Phys. Rev. Lett. (PRL **112**, 151803 (2014)), and the electron charge asymmetry has been published in Phys. Rev. D (PRD **91**, 032007 (2015)).
- **Measurement of the Forward-Backward Charge Asymmetry (A_{FB}) in $p\bar{p} \to Z/\gamma^* \to e^+e^-$ events at DØ (July 2007 - Present)**
  - I measured the unfolded A_{FB} distribution and extracted the effective weak mixing angle using 1.1 fb^{-1} of data collected by the DØ detector for the first time, and then performed same analysis with a larger dataset (5 fb^{-1}). In addition to the A_{FB} and $\sin^2\theta_W^{eff}$ measurements, I also performed the extraction of Z to light quark couplings. This is the

most precise direct measurement of Z to light quark couplings to date. The result was published in Phys. Rev. Lett. (PRL **101**, 191801 (2008)) and Phys. Rev. D (Phys. Rev.D **84**, 012007 (2011)).

- I am currently working on this analysis with the full data-set (10 fb^{-1}). With the full dataset, the $\sin^2\theta_W^{eff}$ and Z-light quark couplings measurements will become a legacy measurement at hadron collider. The new results has been submitted to Phys. Rev. Lett., with arXiv number *1408.5016*.

- **Search for Sneutrino particle via $e+\mu$ state (2005 - 2010)**

  - I searched for $\tilde{\nu}$ via the $e+\mu$ channel using 1 fb^{-1} of data. We set the world's best limits on the parameters of a particular supersymmetric model which predicts an enhancement of the high p_T $e\mu$ final state via R-parity violating production and decay of sneutrino particles. This result was published in Phys. Rev. Lett. (PRL **100**, 241803 (2008)).
  - I performed the same analysis using 5.3 fb^{-1} of data. The result was published in Phys. Rev. Lett. (PRL **105**, 191802 (2010)).

- **Convener of DØ physics group (Sept. 2011 - Sept. 2014)**

  - In August 2012, I was appointed as co-convener of the DØ **Electroweak** physics group. This group is one of five physics groups in DØ and has three subgroups, the W mass group, WZ properties group, and Di-boson group. I took responsibility for coordinating these three groups, supervising the postdocs and Ph.D students, following and reviewing each analysis, and organizing and chairing the meetings.
  - In September 2011, I was appointed as convener of DØ **Di-Boson** group, which is a sub-group of DØ **Electroweak** Group. My responsibilities include overseeing the progress of **Di-Boson** analyses at DØ, helping students and postdocs with specific analysis aspects, reviewing analysis notes and publication drafts before their consideration by the editorial board, as well as organizing and chairing bi-weekly meetings of **Di-Boson** group.
  - In September 2011, I was appointed as convener of DØ **WZ-Properties** sub-group of DØ Electroweak Group. This position has the same responsibilities as **Di-Boson** group convenership. This group mainly focuses on W and Z boson cross section and properties measurements, including differential cross section measurements of the W and Z boson, W boson charge asymmetries measurements, and Z charge asymmetries measurements. We are performing several legacy measurements of electroweak physics, such as determining the W charge asymmetries, weak mixing angle, and Z-light quark couplings, all of which are essential and complementary to the LHC.

Algorithm Experiences

- **Co-Convener of Calorimeters Calibration group at DØ (2011 - 2012)**

  - From September 2011 to June 2012, as a co-convener of the calorimeter calibration group, I organized and led the last DØ calorimeter calibration. A precise and accurate calorimeter calibration enables crucial precision measurements to be performed at DØ, for example the W mass measurement and the *top* mass measurement. With the calorimeter aging, and with very high instantaneous luminosity at the Tevatron in the year 2011 run, the calorimeter calibration was more challenging than in previous years.

- **ϕ inter-calibration of the electromagnetic and hadronic calorimeters at DØ (2007 - 2011)**
  - I performed ϕ inter-calibration for both the electromagnetic and hadronic calorimeters after the 2009 shutdown. The ϕ inter-calibration equalizes the response of each η ring and reduces the constant term for the calorimeter energy resolution. This is very important for almost all analyses done at DØ.
  - I performed the stability check of the calibration constants every six months and monitored the calorimeter performance over time.
- **Electron identification at DØ (April 2007 - 2010)**
  - I determined the di-electron trigger efficiency for the first time at DØ. With increasing instantaneous luminosity, the OR of single electron triggers is not fully efficient for electrons with transverse momentum (p_T) less than 30 GeV. This threshold (30 GeV) is too tight for many analyses. Because a di-electron trigger can be used to improve the trigger efficiency in the low p_T region, almost all analyses with di-electron or diphoton final states (such as measurements of Z boson properties using $Z \to ee$ events or the search for the SM Higgs boson in di-electron channel) benefit from this study.
  - I studied the electron track-matching requirement for Run IIb data. The new requirement has greatly reduced the probability for a jet to fake an electron.
  - I studied the electron energy scale versus instantaneous luminosity and derived correction factors. This correction helped to improve the electron energy resolution for the whole RunIIb data dataset.

Hardware Experiences

- **Level-1 track trigger upgrade for Compact Muon Solenoid (CMS)**
  - In July 2013, I joined the level-1 track trigger upgrade project. The reach of the CMS HL-LHC physics program will depend critically on its ability to use tracking information at L1. Therefore, the tracking trigger is a crucial component of the Phase II upgrade. Recently, Fermilab proposed an architectural design for the CMS L1 tracking trigger. This architecture is based on the Advanced Telecom Computing Architecture (ATCA) standard with full-mesh backplane used for managing high volume incoming data. This is done in such a way that the I/O bandwidth demands are manageable at the system, board and chip level, making it possible to have an early technical demonstration with existing technology. My specific contributions to this project will be the development of the vertical-slice demonstrator and the testing of the Data Input Board, a general purpose board, which will be used in both the ATLAS L2 Fast TracKer (FTK) and CMS Level-1 trigger upgrade.

Publications as Primary Author

- Measurement of the effective weak mixing angle in $p\bar{p} \to Z/\gamma^* \to e^+e^-$ events, V. M. Abazov *et al.* (DØ Collaboration), submitted to Phys. Rev. Lett., arXiv:1408.5016.
- Measurement of the electron charge asymmetry in $p\bar{p} \to W + X \to e\nu + X$ decays in $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV, V. M. Abazov *et al.* (DØ Collaboration), Phys. Rev. D **91**, 032007 (2015).
- Measurement of the W boson production charge asymmetry in $p\bar{p} \to W + X \to e\nu + X$ events at $\sqrt{s} = 1.96$ TeV, V. M. Abazov *et al.* (DØ Collaboration), Phys. Rev. Lett. **112**, 151803 (2014).

- Measurement of $\sin^2\theta_W^{eff}$ and Z-light quark couplings using the forward-backward charge asymmetry in $p\bar{p} \to Z/\gamma^* \to e^+e^-$ events with L=5.0 fb^{-1} at $\sqrt{s} = 1.96$ TeV, V. M. Abazov *et al.* (DØ Collaboration), Phys. Rev. D **84**, 012007 (2011).
- Measurement of the forward-backward charge asymmetry and extraction of $\sin^2\theta_W^{eff}$ in $p\bar{p} \to Z/\gamma^* \to e^+e^- + X$ events produced at $\sqrt{s} = 1.96$ TeV, V. M. Abazov *et al.* (DØ Collaboration), Phys. Rev. Lett. **101**, 191801 (2008).
- Search for Sneutrino Production in eμ Final States in 5.3 fb^{-1} of $p\bar{p}$ Collisions at $\sqrt{s} = 1.96$ TeV, V. M. Abazov *et al.* (DØ Collaboration), Phys. Rev. Lett. **105**, 191802 (2010).
- Search for scalar neutrino particles in e+μ final states in $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV, V. M. Abazov *et al.* (DØ Collaboration), Phys. Rev. Lett. **100**, 241803 (2008).