Emanuel A. Strauss

Contact Information

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Personal Information

Dual Citizenship: U.S.A. and Belgium
Fluent in English and French

Education

Stony Brook University, Stony Brook, NY, USA — **2004 – 2009**
Doctor of Philosophy - Physics
- Advisors: John D. Hobbs and Paul D. Grannis

Johns Hopkins University, Baltimore, MD, USA — **2000 – 2004**
Bachelors of Arts - Physics / Bachelors of Science - Computer Science

Experience

Stanford / SLAC, Menlo Park, CA, USA — **2009 – present**
Research Associate

Presentations

Results of the search for Heavy Higgs and BSM Higgs Bosons from ATLAS — **2013**
Aspen 2013: Higgs Quo Vadis, Aspen, CO, USA

In the Shadhow of the Higgs — **2012**
SLAC Public Lecture, Menlo Park, CA, USA

Online Measurement of LHC Beam Parameters with the ATLAS High Level Trigger — **2011**
ACAT2011, London, UK

A Search for Lepton-Jets with Muons in the ATLAS Detector — **2011**
BOOST2011, Princeton, NJ, USA

ZZ Observation at the Tevatron — **2009**
Young Scientists Talk, Moriond EW, La Thuile, Italy

Search for ZZ Production in $p\bar{p}$ Collisions Using the DØ Detector — **2009**
APS April Meeting, St. Louis, MO, USA

Selected Publications

G. Aad *et al.* [ATLAS Collaboration], "A Search for Prompt Lepton-Jets in pp Collisions at $\sqrt{s} = 7\,\text{TeV}$ with the ATLAS Detector", Phys. Lett. B **719** (2013) 299-317.

G. Aad *et al.* [Atlas Collaboration], "Performance of the ATLAS Trigger System in 2010", Eur. Phys. J. C **72** (2012) 1849.

V. M. Abazov *et al.* [DØ Collaboration], "Search for ZH to $\ell\ell$bb production in 4.2 pb^{-1} of $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV", Phys. Rev. Lett. **105**, 251801 (2010).

V. M. Abazov *et al.* [DØ Collaboration], "Observation of ZZ production in $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV", Phys. Rev. Lett. **101**, 171803 (2008).

V. M. Abazov *et al.* [DØ Collaboration], "$ZZ \to \ell^+\ell^-\nu\bar{\nu}$ production in p anti-p collisions at $\sqrt{s} = 1.96$ TeV", Phys. Rev. D **78**, 072002 (2008).

Posters

A System for Monitoring and Tracking the LHC Beam Spot within the ATLAS High Level Trigger — **2012**
CHEP, New York, NY. USA

Measurement of the LHC Beam Parameters Using the Distributed High Level Trigger System of the ATLAS Detector During 2009 and 2010 — **2010**
CHEP, Taipei, Taiwan

Characterization of Interaction-Point Beam Parameters Using the pp Event-Vertex Distribution Reconstructed in the ATLAS Detector at the LHC — **2010**
IPAC, Kyoto, Japan

$ZH \to e^+e^-b\bar{b}$ — **2009**
Fermilab User's Meeting, Batavia, IL. USA

ZZ Observation at the Tevatron — **2008**
Fermilab User's Meeting, Batavia, IL. USA

Awards

Runner Up: Fermilab User's Meeting Poster Competition — **2009**
Nathaniel and Fannie Sorof Award — **2006**

Research

Co-Trigger Operations Manager **2012 – 2013**
Deputy Trigger Operations Manager **2011 – 2012**

The Trigger Operations Manager and his deputy are tasked with the proper running of the ATLAS trigger system. In so doing, we are responsible for scheduling changes to the trigger in the ATLAS control room while liasing with Run Coordination and the various sub-detector experts. This also means making any operational decisions that require immediate action (typically < 24h). A crew of five on-call shifters report to us. With their help we monitor the online system, shepherd new features through the development and validation pipeline, and provide support for special ATLAS tests and physics runs. Much of my efforts in the past year have been focused on optimizing the shift crew and reducing the number of on-calls, improving the automated monitoring of the trigger rates, and preparing the system for higher luminosity running.

MSSM $b(H \to bb)$ **2012 – present**

For certain parameters of the Minimal Supersymmetric Standard Model the Heavy Higgs boson (which could accompany the scalar boson observed by ATLAS at 126 GeV) may decay exclusively to pairs of τ particles or b-quarks. The SLAC group has undertaken an analysis searching for events of the latter kind. The signature was completely unattended to. It is a difficult final state for an experiment at a hadron collider to detect because of large sources of background, but caters especially to the expertise of the SLAC group. I have been supervising a Stanford student based at CERN. We are in active development, with several presentations made to the ATLAS Higgs sub-group and a preliminary result planned for this winter.

Exotic Lepton Jets **2009 – 2013**

The presence of a massive photon in the dark sector would explain some anomalies in the dark matter data and may produce collimated groups of leptons. I was responsible for developing an analysis framework, designing selection requirements, estimating the efficiencies, and assesing the sensitivity of the first public result using muons. In 2011, I presented the limits on the signal cross-section at the BOOST conference on behalf of the ATLAS Collaboration. The result generated significant interest in the exotics group, and I was joined by two students and several staff scientists who helped process additional data and develop the electron channel. The latest anlaysis using both electrons and muons has been published in PLB.

Beamspot Measurement **2009 – present**

The b-jet triggers require precise knowledge of the position and size of the three-dimensional luminosity distribution to maintain a high signal purity. I developed tools which measure the luminous region width, correcting for resolution effects *in-situ* using the ATLAS High-Level Trigger (HLT). These values are calculated for each of the > 1300 proton bunch crossings. Of the four major detectors on the LHC, ATLAS is the only one with the ability to publish this information in real-time. I presented this technical achievement at the ACAT conference in 2011. The data are now published to databases for use by HLT algorithms and ATLAS monitoring. These values have been of interest outside of the ATLAS collaboration as well. LHC accelerator physicists have included our work in some of their own papers and conference presentations.

Standard Model $ZH \to \ell\ell bb$ **2008 – 2010**

By expanding our coverage to include events in which only one muon passes the typical selection requirements and the other is selected using only an isolated track I added an extra 15% acceptance to the DØ dimuon ZH analysis, effectively raising the signal acceptance close to 95%. Additionally, I implemented a kinematic fit which balances the energies and angles of the signal's leptons and jets, using the momentum of the diboson system and the dilepton mass as constraints. When added to the analysis multivariate classifier, these fit variables improve the sensitivity across all dilepton channels by about 7%. Finally, I was responsible for the combination and limit setting of the sub-channels. This analysis was published in 2010, along with the standard muon and electron channels, and still contributes to the Tevatron Higgs limit combination.

Jet Energy Resolution **2007 – 2009**

I worked on using an H-Matrix method, in which the correlations among observables are used to estimate a hidden variable, to predict the parton energy of jets. The method works well for the energy spectra of various physics processes, providing a 10 to 15% improvement for light and heavy signal jets reconstructed in the DØ calorimeter.

Standard Model $ZZ \to \ell\ell\nu\nu$ **2007 – 2008**

For this analysis, I helped develop a new experimental variable which is robust against $\not\!\!E_{\mathrm{T}}$ mis-measurements. Although the rate of mis-measurements at the DØ detector are small, it was a major problem in this analysis where the signal (ZZ) cross section is four orders of magnitude smaller than the dominant background (Drell-Yan). This new variable improved the signal acceptance vs background rejection by an order of magnitude, with respect to the traditional formulation of $\not\!\!E_{\mathrm{T}}$. This analysis contributed, alongside the $ZZ \to \ell\ell\ell'\ell'$ analysis, to the first observation of ZZ production at a hadron collider. It was the subject of two publications, and I presented it at the 2009 Moriond EW conference Young Scientists forum.