Alexander A. Paramonov

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Personal Information:
Citizenship: Russia
Family: Married

Education:
- The University of Chicago
  Ph.D. Physics, June 2009. Advisor: Henry J. Frisch
- Moscow Institute of Physics and Technology (Russia)
  M.S. Physics and Applied Math with Honors, June 2005
  B. Sc. Physics and Applied Math with Honors, June 2003.

Employment:
- Argonne National Lab, Maria Goeppert Mayer Postdoctoral Fellow, June 2009-June 2012

Honors and Awards:
- Best Poster Award for "Search for the Neutral Current Top Quark Decay t→Zc", Hadron Collider Physics Symposium 16-20 November 2009, Evian (France)
- Maria Goeppert Mayer (Argonne Named) Postdoctoral Fellowship 2009 (accepted)
- CERN Postdoctoral Fellowship for 2009 (declined)
- Sugarman award for Excellence in Graduate Student Research, 2006-2007
- Diploma at all-Russian Olympiad in physics, 1999

Research Positions:
- Leader/coordinator, W+jets Physics Group, ATLAS experiment, Dec. 2010 – Nov. 2011

Professional Service:
- Session chair, BNL workshop on SUSY, BNL, May 2012
- Panel member and co-organizer, Chicagoland and Midwest dark matter workshop, FNAL, April 2012
- Convener/co-organizer, US ATLAS analysis jamboree, ANL, November 2010
- Reviewer of Phys. Rev. Lett.
- Reviewer of Phys. Lett. B

Research Experience:
1. Argonne National Laboratory, ATLAS and CDF Collaborations

2011-2012 **Search for new physics using events with three leptons and multiple jets in pp collisions at $\sqrt{s}$=7 TeV with the ATLAS detector** (major contribution to the effort)
The search is targeting gluino-mediated and direct production of stop quarks. The

search also has sensitivity to fourth-generation quarks. It utilizes the 5 fb^{-1} of data collected in 2011. The result is expected to be ready by the summer conferences.

2010-2011 **Study of jets produced in association with a W boson in pp collisions at √s=7 TeV with the ATLAS detector** (coordination of the measurement; leading contribution to the effort; results for the muon channel; co-editor of the paper)
The analysis was performed at the ATLAS experiment at CERN using the full 36 pb^{-1} of data collected in 2010. We have updated the previous measurement with a novel NLO QCD calculation, BlackHat-Sherpa, that includes production of W boson in association with up to four jets. In comparison to the previous result, this measurement covers a wider kinematic phase space and includes additional distributions. A preliminary result was announced as public in April 2011; "Measurement of the production cross section for W-bosons in association with jets in pp collisions using 33 pb^{-1} of data at √s=7 TeV with the ATLAS detector ", ATLAS-CONF-2011-060. The final result is published in **Phys. Rev. D** 85 (2012) 092002.

Invariant mass distribution of jet pairs produced in association with one lepton and missing transverse energy at the ATLAS experiment (major contribution to the effort; distributions for the muon channel)
We have measured cross section for a pair of jets to be produced in association with a W-boson. The cross section is measured as a function of the invariant mass of the jet pair. The measurement was highly motivated by the recent observation by the CDF collaboration, "Invariant Mass Distribution of Jet Pairs Produced in Association with a W Boson in ppbar Collisions at √s=1.96 TeV", Phys. Rev. Lett., 106:17, (2011). We have released a preliminary result early in May of 2011; "Invariant mass distribution of jet pairs produced in association with one lepton and missing transverse energy at the ATLAS experiment", ATLAS-CONF-2011-069.

2009-2010 **Measurement of the production cross section for *W*-bosons in association with jets in *pp* collisions at √s=7 TeV with the ATLAS detector** (leading contribution to the effort; results for the muon channel and jet-related systematic uncertainties)
The analysis was performed at the ATLAS experiment at CERN using 1.3 pb^{-1} of data. The measurement features absolute cross sections for W+ ≥N jets and ratios of the cross sections, σ(W+ ≥N jets)/σ(W+ ≥N-1 jets). The results are found in a good agreement with NLO pQCD predictions for up to two jets and with ME+PS simulations (Sherpa and Alpgen) normalized to NNLO total cross section. The paper is published in **Phys. Lett. B** 698:5, (2011), pp. 325-345.

Photo-cathode development for the Picosecond Timing Project (LAPD) http://psec.uchicago.edu/
We work on activation and characterization of III-V and multi-alkali photo-cathodes for the Psec Timing project. The photocathode development involves APS, MSD, and the chemistry division at the ANL.

2008-2009 **Present Limits on the Precision of SM Predictions for Jets Energies.**
(primary author).
We use 4.5 fb^{-1} of CDF data to analyze the systematic uncertainties on the Standard Model predictions for hadronic jets. The study is performed using balance of

transverse momentum in events with a Z-boson and a jet. The presented method can be repeated at the LHC experiments (ATLAS and CMS). We suggest using the resulting distributions to fit the parton showering parameters in event generators for more accurate jet energy predictions.

Tier-0 monitoring software for ATLAS minimum bias triggers
The set of monitoring tool is used to monitor data quality, stability and performance of the Minimum bias triggers. The list of triggers covers MBTS, BCM, LUCID, ZDC, and track-based systems. (I continue support of the tool as my service to ATLAS).

2. The University of Chicago, CDF Collaboration

2007-2008 **Search for Flavor Changing Neutral Currents in Top decays at CDF**
(Ph. D. Thesis topic, primary author).
A data-driven approach of searching for the FCNC decays of the top quark. The approach does not rely on assumptions regarding top pair production cross-section since it uses samples with W + 4 jets and Z + 4 jets. This also allows canceling a number of systematic uncertainties. The structures of the unknown FCNC couplings are reflected in the polarization of the Z-bosons produced in the top quark decays. We vary the polarization as a free parameter to cover the full set of possible FCNC couplings. We obtain an upper limit of 8.3% on Br(t→Zc) using 1.5 fb^{-1} of CDF data for decays with 100% longitudinally polarized Z's. The result is limited by statistics, so that this approach can provide much more accurate measurements using high statistics datasets from future experiments such as ATLAS and CMS.

2006 **A signature based search for anomalous production of Z-boson in association with one or two objects such as photons, leptons, missing transverse energy, or large total transverse energy** (primary author).
We perform a search for two types of inclusive final states; Z+X and Z+X+Y, where X and Y can be leptons, photons, missing transverse energy, or large total transverse energy. For every final state we compare the number of observed events to that expected from the Standard Model. The search covers integrated luminosity of 0.94 fb^{-1}. We see excellent agreement with the SM expectations (alas).

2005 **A Study of Anomalous Production of Z-bosons with High Transverse Momentum at the Tevatron** (primary author)
We studied the differential cross-section of inclusive Z-bosons produced with large transverse momentum. The observed distribution and the Standard Model expectation obtained with CDF-tuned PYTHIA (this version of PYTHIA was adjusted to model underlying events with Run I data) were found to be in good agreement. Also we have compared the results with the predictions of a specific model, proposed by Bjorken, Pakvasa, and Tuan, of heavy right-handed quarks that decay into W, Z, and Higgs bosons. No sign of anomalies was found. The analysis was performed using 305 pb^{-1} of data.

2004 **A 96-Channel FPGA-based Time-to-Digital Converter.**
An FPGA-based, 96-channel, time-to-digital converter (TDC) intended for use with the Central Outer Tracker in the CDF experiment at the Fermilab Tevatron. The TDC is physically configured as a 9U VME card. The functionality is almost

entirely implemented via two Altera Stratix FPGA chips. I designed firmware for Fast Tracking Trigger Processor logic using Quartus software package from Altera. Also I tested the complete firmware logic using vector waveform simulations inside Quartus before TDC boards were manufactured. To test the functionality of an actual board I developed a software suit which performs bit-by-bit comparison between board's output and its computer-based simulation.

3. Moscow Institute of Physics and Technology, H1 Collaboration

2002-2003 **Measurement of the Cross-Section of Inclusive Photo-Production of φ^0 Mesons at DESY.**
Basic data analysis. Monte Carlo simulations. Introduction to PAW and Fortran. We used data from the H1 experiment at DESY.

Presentations and Posters

- "Background Rejection Techniques in Measurements with Jets", Chicago 2012 workshop on LHC Physics, May 2012
- "Study of jets produced in association with a vector boson", HEP Seminar, Iowa State University, April 2012
- "W/Z + jets and W/Z + heavy flavor production at the LHC", 47th Rencontres de Moriond on QCD and High Energy Interactions, La Thuile, Italy, March 2012
- "ATLAS: Physics Highlights", US LHC Users Organization Annual Meeting, Argonne National Laboratory, November 2011
- "Measurement of the production cross sections for *W*- and *Z*- bosons in association with jets at ATLAS", US ATLAS Physics Workshop, Boston University, August 2011
- "Invariant mass distribution of jet pairs produced in association with one lepton and missing transverse energy at the ATLAS experiment", Implications at the LHC of BSM interpretations of CDF's ttbar forward-backward asymmetry and Wjj anomaly, LHC Physics Center at CERN, May 2011
- "Measurement of the production cross section for W- and Z-bosons in association with jets with the ATLAS detector", Particle Physics Seminar, University of Notre Dame, February 8, 2011
- "Measurement of W/Z-boson production in association with jets at ATLAS", Plenary talk at the Conference on LHC First Data, Ann Arbor (MI, USA), December 2010
- "Limitations on the predictions for p_T-balance in events with a Z-boson and jets", Presentation at PHENO 2010
- "Limitations on the predictions for p_T-balance in events with a Z-boson and jets", Presentation at DIS 2010, Florence (Italy)
- "Search for the Neutral Current Top Quark Decay $t \rightarrow Zc$", Poster at Hadron Collider Physics Symposium 2009, Evian (France)
- "Search for Flavor Changing Neutral Currents in Top decays at CDF", Presentation at PHENO 2008
- "Search for Flavor Changing Neutral Currents in Top Decays at CDF", Poster presentation at APS April Meeting 2008
- "A Study of Anomalous Production of Z-Bosons with High Transverse Momentum at the Tevatron", Poster presentation at APS April meeting 2006

Public Conference Results and Publications

- "Study of jets produced in association with a W boson in pp collisions at √s=7 TeV with the ATLAS detector", **Phys. Rev. D** 85 (2012) 092002, arXiv:1201.1276 [hep-ex]
- "Invariant mass distribution of jet pairs produced in association with one lepton and missing transverse energy at the ATLAS experiment", ATLAS-CONF-2011-069, http://cdsweb.cern.ch/record/1349310
- "Measurement of the production cross section for W-bosons in association with jets in pp collisions using 33 pb^{-1} of data at √s=7 TeV with the ATLAS detector ", ATLAS-CONF-2011-060, http://cdsweb.cern.ch/record/1344778
- "Measurement of the production cross section for W-bosons in association with jets in pp collisions at √s = 7 TeV with the ATLAS detector", **Phys. Lett. B** Volume 698, Issue 5, 25 April 2011, Pages 325-345, arXiv:1012.5382 [hep-ex]
- "Present Limits on the Precision of SM Predictions for Jet Energies", **Nucl. Instrum. Meth. A** 622 (2010) 698–710, arXiv:1008.0344 [hep-ex]
- "Limitations on the predictions for p_T-balance in events with a Z-boson and jets", DIS 2010 proceedings, PoS(DIS2010)130
- "Present Limits on the Precision of SM Predictions in Signatures with Jets", CDF10082, The CDF Collaboration, 2010
- "Search for the Neutral Current Top Quark Decay t→Zc Using Ratio of Z-Boson + 4 Jets to W-Boson + 4 Jets Production", HCP2009 symposium proceedings, PoS(HCP2009)090
- "Search for the Neutral Current Top Quark Decay t→Zc Using Ratio of Z-Boson + 4 Jets to W-Boson + 4 Jets Production", **Phys.Rev.D**80:052001, arXiv:0905.0277, 2009
- "A limit on the Branching Ratio of the Flavor-Changing Top Quark Decay t→Zc", CDF9285, The CDF Collaboration, 2008
- "Anomalous Production of Z-Bosons with High Transverse Momentum in 0.94 pb^{-1} at the Tevatron", CDF8452, The CDF Collaboration, 2006
- "Study of Anomalous Production of Z-Bosons with High Transverse Momentum at the Tevatron" , CDF8164, The CDF Collaboration, 2006
- Author on ~250 CDF Collaboration peer-reviewed publications since 2005
- Author on ~150 ATLAS Collaboration peer-reviewed publications since 2010
- "A 96-Channel FPGA-based Time-to-Digital Converter", Nucl**. Instrum. Meth. A**554 (2005) 444-457, arXiv:physics/0502062v1

ATLAS Internal Notes

- "Companion public documentation for "Study of ***W***-boson production with jets in ***pp*** collisions at √s=7 TeV with the ATLAS detector"", ATL-COM-PHYS-2011-1317, September 2011
- "Estimation of dijet backgrounds to Z→μμ decay with the matrix method and in situ determination of muon identification efficiency and jet to muon fake rate", L. Marchetti and A. Paramonov, ATL-COM-PHYS-2011-1031, August 2011
- **"**Measurement of the cross-section for jets produced in association with a W-boson in pp collisions at √s=7 TeV**",** ATL-PHYS-INT-2012-003, G. Arabidze et al., July 2011
- **"**Supporting Document: Invariant mass distribution of jet pairs produced in association with one lepton and missing transverse energy at the ATLAS experiment**",** ATL-COM-PHYS-2011-396, B Abi et al., April 2011
- **"**Measurement of the cross-section for jets produced in association with a W-boson in pp collisions at √s=7 TeV**",** ATL-COM-PHYS-2011-280, G. Arabidze et al., March 2011
- "Supporting plots for «Measurement of the production cross section for W-bosons in association with jets in pp collisions at √**s=7** TeV with the ATLAS detector»", ATL-COM-PHYS-2010-977, A. Ahmad et al., 2010

- "Measurement of the production cross section for W-bosons in association with jets in pp collisions at $\sqrt{s}$ = 7 TeV with the ATLAS detector", ATL-COM-PHYS-2010-883, A. Ahmad et al., 2010
- "Measurement of the cross-section for jets produced in association with a W-boson in pp collisions at $\sqrt{s}$ = 7 TeV", ATL-COM-PHYS-2010-883, A. Ahmad et al., 2010
- "Muon selection requirements for measurements of W-boson production in association with jets", ATL-COM-PHYS-2010-757, B. T. Martin and A. A. Paramonov, 2010
- "Estimation of QCD Backgrounds for $W \rightarrow \mu\nu$ + N-jets Using Template Method", ATL-COM-GEN-2010-037, A. Johnson and A. Paramonov, 2010

CDF Internal Notes

- "Theory-driven limitations on p_T-balance in events with a Z-boson and jets", CDF10026, A. Paramonov, F. Canelli, H.J. Frisch, M. D'Onofrio, and S. Mrenna, 2010
- "A limit on the Branching Ratio of the Flavor-Changing Top Quark Decay $t \rightarrow Zc$", CDF9101, Alexander Paramonov and Henry J. Frisch, 2007
- "Anomalous Production of Z-Bosons with High Transverse Momentum in 0.94 pb-1 at the Tevatron", CDF8316, Alexander A. Paramonov and Henry J. Frisch, 2006
- "Study of Anomalous Production of Z-Bosons with High Transverse Momentum at the Tevatron", CDF8033, Alexander A. Paramonov and Henry J. Frisch, 2006

Students/Mentoring experience:

- Andrew Johnson, summer intern at Argonne National Lab. from CMU, "Estimation of QCD Backgrounds for $W \rightarrow \mu\nu$ + N-jets Using Template Method", August 2010. The method was used for "Measurement of the production cross section for W-bosons in association with jets in pp collisions at $\sqrt{s}$ = 7 TeV with the ATLAS detector", **Phys. Lett. B** Volume 698, Issue 5, 25 April 2011, Pages 325-345. Andrew was added to the author list of the paper.
- Linus Marchetti, summer intern at Argonne National Lab. from CMU, "Estimation of di-jet background to $Z \rightarrow \mu\mu$ decays with the matrix method and in situ determination of muon identification efficiency and jet to muon fake rate", August 2011, ATL-COM-PHYS-2011-1031.
- I had an opportunity to share my experience with Brian Thomas Martin, MSU grad student. I worked with Brian closely on the cross section measurement for jets produced in association with a W-boson in 2010 and 2011. The measurement became Brian's PhD thesis.

Teaching experience:

- TA for Physics 140-level courses at the UChicago in 2008-2009
- Math and Physics Tutor at the UChicago in 2005-2007