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Education

- Ph.D. in Physics, University of Rochester (2004)
- M.S. in Physics, Moscow Institute of Physics and Technology, Russia (1989)

Appointments

- Professor, Oklahoma State University (2019-present)
- Associate Professor, Oklahoma State University (2014-19)
- Assistant Professor, Oklahoma State University (2008-14)
- Research Assistant Professor, Oklahoma State University (2006-08)
- Assistant Research Scientist, Oklahoma State University (2005-06)
- Research Associate, Fermilab (2004-05)
- Graduate Research Assistant, University of Rochester (2003-04)
- Graduate Research Assistant, Kansas State University (2000-03)
- Scientific Associate, CERN (1998-99)
- Project Associate, CERN (1996-98)
- Researcher, Institute for Theoretical and Experimental Physics, Moscow, Russia (1989-99)

Professional experience

- ATLAS experiment at the Large Hadron Collider (LHC), CERN

Top quark physics: Measured the top quark pair production cross section in the lepton+jets channel (first analysis in the top group using the multivariate technique). Measured the top quark pair production in association with hard jets (first measurement at the LHC) and jet multiplicity in top quark pair decays. Proposed a new method of measuring the heavy flavor composition of jets produced in association with top quark pairs, and performed the first ATLAS measurement of production cross section of top quark pairs with additional heavy flavor jets.

b-tagging: Lead the Oklahoma effort on estimation of the non-heavy-flavor jet-tagging probability (mistag rate). Our group was responsible for the calibration of mistag performance in ATLAS data since 2010. Organized and lead the ATLAS group responsible for evaluation of b -tagging performance in the High Luminosity LHC upgrade, which is a crucial component of detector performance affecting majority of physics studies to be performed at the upgraded ATLAS detector. Contributed to development of the first ATLAS b -tagging efficiency calibration procedure based on relative momentum of muons inside jets (p_T^{rel}) still used in the experiment.

Searches for new physics: Contributed to search for supersymmetry in final states with missing transverse momentum and multiple b -jets in the final states; search for W' boson decaying into top and bottom quarks; search for exotic Higgs boson decays in the $h \rightarrow aa \rightarrow 4b$ channel where a is a long lived particle decaying in the tracker.

Higgs boson physics: Member of the editorial board for the observation of the Higgs boson decaying into a pair of b -quarks, the most-common but very difficult to detect Higgs boson decay channel. Searched for a heavy charged Higgs boson decaying into top and bottom quarks. Convener of US ATLAS Higgs analysis forum (2010-11). Co-organized US ATLAS Higgs Forum Meeting in BNL in May 2011.

ATLAS pixel detector: Support and development of ATLAS pixel detector calibration database software (2010-11).

- High Energy Physics (HEP) phenomenology

In collaboration with OSU HEP theorists, worked on probabilistic interpretation of the Standard Model parameters under anarchy hypothesis.

- DØ experiment at the Tevatron, Fermilab

Convener of the tracking group (2008-09). Convener of the DØ Higgs group (2006-08). Leader of the DØ joint Higgs-new phenomena multilepton working group (2005-06). During my leadership, the DØ Higgs group produced results which in August 2008 lead to the first time exclusion of the Higgs boson with a mass of 170 GeV. Performed a search for the associated Higgs boson production in the $p\bar{p} \rightarrow WH \rightarrow WWW^* \rightarrow l^\pm l'^\pm + X$ process, and set the world best limit on the $p\bar{p} \rightarrow WH \rightarrow WWW^*$ production cross section. Wrote a track finding algorithm (Histogramming Track Finder, HTF) for the DØ central tracker. All DØ data collected since June 2002 was reconstructed using HTF. Developed a heavy-flavor jet-tagging algorithm (Counting Signed Impact Parameter, CSIP). Using this algorithm, measured the $t\bar{t}$ production cross section in the lepton+jets channel. Observed the $\chi_c \rightarrow J/\psi + \gamma$ process with γ reconstructed via e^+e^- conversions and studied the χ_{c1}/χ_{c2} production ratio. Wrote the track reconstruction code for the proposed DØ silicon tracker for Run IIb upgrade, and participated in performance studies that were incorporated into the DØ Run IIb Upgrade Technical Design Report. Contributed to simulation studies of the silicon microstrip detector and cluster reconstruction.

- 2004-05: LHC Physics Center at Fermilab

Leader of the CMS tracking group at the LHC Physics Center. Started this group from scratch in 2004. Initiated the work on a new track finding approach aimed at finding tracks without relying on innermost precise tracking detectors (pixels). Contributed to the development of the new CMS software framework CMSSW currently adapted by the CMS collaboration. Co-organized the LHC/Tevatron Tracking Workshop at Fermilab in August 2004.

- 1994-99: CMS experiment at the LHC, CERN

Wrote a track finding algorithm (Global Track Finder, GTF) for the CMS central tracker. Participated in studies of the CMS tracker performance, summarized in the Tracker Project Technical Design Report released in April 1998. Contributed to the development of the principal CMS simulation reconstruction package (CMSIM) and later the first C++ object oriented reconstruction framework for the CMS analysis (ORCA). One of three authors of the CMS fast Monte Carlo simulation package (CMSJET) which has been extensively used for physics studies since 1994.

- 1989-96: 3m Magnet Spectrometer at ITEP Proton Synchrotron, Moscow, Russia

Participated in data collection and analysis on the following experiments: production of strange particles in baryon exchange processes (ITEP-875), quasi elastic (π - d) backward scattering on nuclei at 0.7–1.3 GeV (ITEP-901), pion double charge exchange on light nuclei at 0.7–1.3 GeV (ITEP-923), and search for d' dibaryon in pp interactions (ITEP-942).

Invited presentations since joining OSU

- “Combinations of SUSY searches,” International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY), July 2023, Southampton, UK.
- “Flavour Tagging with Graph Neural Network with the ATLAS Detector,” Lake Louise Winter Institute, February 2023, Lake Louise, AB, Canada.
- “Algorithms and Upgrade,” ATLAS FTAG Workshop, October 2022, Amsterdam, Netherlands.
- “Jet flavour tagging for the ATLAS experiment,” 10th International Conference on New Frontiers in Physics, August 2021, Kolymbari, Crete, Greece.
- “Beyond the standard model physics at the HL-LHC,” 27th International Conference on Supersymmetry and Unification of Fundamental Interactions, May 2019, Corpus Christi, TX.
- “ $t\bar{t}+b\bar{b}$ at ATLAS and CMS,” International Workshop on Top Quark Physics (TOP), September 2018, Bad Neuenahr, Germany.
- “Flavor aspects of ATLAS+CMS top program,” HL/HE LHC Workshop, April 2018, Fermilab, Batavia, IL.
- “Roadmap to Pixel TDR,” ATLAS Flavor Tagging / Higgs to $b\bar{b}$ Workshop, September 2017, Stony Brook University, Stony Brook, NY (also organized the upgrade tagging session).
- “Flavour tagging CP report,” “Upgrade Physics,” ATLAS Overview Week, October 2017, Bratislava, Slovakia.
- “Heavy flavor jet tagging,” US ATLAS Hadronic Final State Forum, December 2017, Southern Methodist University, Dallas, TX.
- “ATLAS physics prospects with the High-Luminosity LHC” (poster), International Conference on High Energy Physics (ICHEP), August 2016, Chicago IL.
- “Measurements of $t\bar{t}+X$ using the ATLAS detector,” International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS), April 2016, DESY Hamburg, Germany.
- “Top quark pair charge asymmetry using the ATLAS detector at the LHC,” QCD@LHC, August 2014, Suzdal, Russia.
- “Beyond-the-Standard Model Higgs Physics using the ATLAS Experiment,” International Conference on New Frontiers in Physics, September 2013, Kolymbari, Crete, Greece.
- “Top quark couplings: $t\bar{t}$ +jets,” Snowmass Energy Frontier Workshop, April 2013, Brookhaven National Laboratory, Upton NY.
- “ $t\bar{t}$ +jets studies,” $t\bar{t}H$ Workshop, May 2013, Austin TX.
- “Top physics with ATLAS,” 15th Lomonosov Conference on Elementary Particle Physics, August 2011, Moscow, Russia.

- “Heavy Charged Higgs,” US ATLAS Higgs Forum Meeting, May 2011, Brookhaven National Laboratory, Upton NY.
- “b-tagging in ATLAS,” Fourth ATLAS Physics Workshop of the Americas, August 2010, Arlington TX.
- “Summary of recent physics results from the Tevatron,” Hadron Structure and QCD, July 2010, Gatchina, Russia.
- “Standard Model Higgs searches at DØ,” Joint Experimental-Theoretical Seminar (Wine and Cheese), September 2007, Fermi National Laboratory, Batavia IL.
- “Searches for the Standard Model Higgs boson at the DØ detector at the Tevatron,” International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY), June 2006, Irvine CA.

Professional service work

- Member of organizing committee, 10th International Conference on Beauty Charm Hyperons in Hadronic interactions (July 2012), Wichita, Kansas, USA.
- Member of organizing committee, 3rd International Workshop on The Interconnection Between Particle Physics and Cosmology (May 2009), Norman, Oklahoma, USA.
- Peer Reviewer for Journal of High Energy Physics
- Proposal Reviewer for DOE

Teaching

- General Physics (calculus based: PHYS 2114, 2314; algebra based: PHYS 1214): large service courses (150-300 students)
- Mechanics I (PHYS 3013): undergraduate level course
- Methods of Mathematical Physics (PHYS 3513): undergraduate level course
- Introduction to Semiconductor Device Physics (PHYS 3313): service course for engineers (30-60 students)
- Statistical Thermodynamic (PHYS 5113): graduate level course
- Statistical Mechanics (PHYS 5213): graduate level course
- Experimental Methods in High Energy Physics (PHYS 6260): special graduate level course

Supervision of students and postdocs

- Derrick Allen (2024-present)
- Saad Mohiuddin (2023-present)
- Soumyananda Goswami (2019-present)
- Jacob Crosby – graduated with a PhD in May 2024
- Wasikul Islam – graduated with a PhD in May 2021
- Dmitri Sidorov – graduated with a PhD in November 2015
- Vallary Bhopatkar (postdoctoral fellow, 2022-present)

- Yanhui Ma (postdoctoral fellow, 2022-present)
- Angela Burger (postdoctoral fellow, 2018-21)
- Josu Cantero (postdoctoral fellow, 2016-21)
- David Jamin (postdoctoral fellow, 2015-17)
- Jie Yu (postdoctoral fellow, 2011-15)

Outreach

- QuarkNet: physics master classes for high school students (2012-current), annual summer workshops for Oklahoma high school teachers (2007-current).
- “The Higgs for the masses,” presentation at Stillwater Centennial Rotary Club (September 2016).
- “The Search for Higgs Boson ‘God Particle’,” presentation at Science Café, Oklahoma State University (October 2012).
- Interviews related to Higgs boson discovery (July 2012): “Teams of Oklahoma researchers celebrate Higgs boson discovery” (NewsOK), “OSU helped Higgs boson discovery” (Fox 23 News), “OSU Physicists Help Make Important Scientific Discovery” (News on 6).

Publications

The full list of 1700+ publications is available at <http://inspirehep.net/author/A.Khanov.1/>
A representative list of publications since joining OSU on which I had major impact, includes:

- G. Aad *et al.* [ATLAS Collaboration], “Study of high-transverse-momentum Higgs boson production in association with a vector boson in the $q\bar{q}bb$ final state with the ATLAS detector,” *Phys. Rev. Lett.* **132**, 131802 (2024).
- G. Aad *et al.* [ATLAS Collaboration], “Search for new phenomena in two-body invariant mass distributions using unsupervised machine learning for anomaly detection at $\sqrt{s} = 13$ TeV with the ATLAS detector,” *Phys. Rev. Lett.* **132**, 081801 (2024).
- G. Aad *et al.* [ATLAS Collaboration], “Search for vector-boson resonances decaying into a top quark and a bottom quark using pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector,” *JHEP* **12**, 073 (2023).
- G. Aad *et al.* [ATLAS Collaboration], “Search for a new scalar resonance in flavour-changing neutral-current top-quark decays $t \rightarrow qX$ ($q = u, c$), with $X \rightarrow b\bar{b}$, in proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector,” *JHEP* **07**, 199 (2023).
- G. Aad *et al.* [ATLAS Collaboration], “Search for new phenomena in multi-body invariant masses in events with at least one isolated lepton and two jets using $\sqrt{s} = 13$ TeV proton-proton collision data collected by the ATLAS detector,” *JHEP* **07**, 202 (2023).
- G. Aad *et al.* [ATLAS Collaboration], “Search for supersymmetry in final states with missing transverse momentum and three or more b -jets in 139 fb¹ of proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector,” *Eur. Phys. J. C* **83**, 561 (2023).
- G. Aad *et al.* [ATLAS Collaboration], “Search for exotic decays of the Higgs boson into long-lived particles in pp collisions at $\sqrt{s} = 13$ TeV using displaced vertices in the ATLAS inner detector,” *JHEP* **11**, 229 (2021).

- G. Aad *et al.* [ATLAS Collaboration], “Search for dijet resonances in events with an isolated charged lepton using $\sqrt{s} = 13$ TeV proton-proton collision data collected by the ATLAS detector.” JHEP **06**, 151 (2020).
- M. Aaboud *et al.* [ATLAS and CMS collaborations], “Physics of the HL-LHC, and Perspectives at the HE-LHC,” CERN Yellow Reports: Monographs, CERN-2019-007 (CERN, Geneva, 2019).
- M. Aaboud *et al.* [ATLAS Collaboration], “Measurement of VH , $H \rightarrow b\bar{b}$ production as a function of the vector-boson transverse momentum in 13 TeV pp collisions with the ATLAS detector,” JHEP **1905**, 141 (2019).
- M. Aaboud *et al.* [ATLAS Collaboration], “Observation of $H \rightarrow b\bar{b}$ decays and VH production with the ATLAS detector,” Phys. Lett. B **786**, 59 (2018).
- M. Aaboud *et al.* [ATLAS Collaboration], “Search for supersymmetry in final states with missing transverse momentum and multiple b -jets in proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector,” JHEP **1806**, 107 (2018).
- G. Aad *et al.* [ATLAS Collaboration], “Technical Design Report for the ATLAS Inner Tracker Strip Detector,” CERN-LHCC-2017-005, ATLAS-TDR-025 (2017).
- K. S. Babu, A. Khanov and S. Saad, “Anarchy with Hierarchy: A Probabilistic Appraisal,” Phys. Rev. D **95**, no. 5, 055014 (2017).
- G. Aad *et al.* [ATLAS Collaboration], “Measurements of fiducial cross-sections for $t\bar{t}$ production with one or two additional b -jets in pp collisions at $\sqrt{s} = 8$ TeV using the ATLAS detector,” Eur. Phys. J. C **76**, no. 1, 11 (2016).
- G. Aad *et al.* [ATLAS Collaboration], “Performance of b -Jet Identification in the ATLAS Experiment,” JINST **11**, no. 04, P04008 (2016).
- G. Aad *et al.* [ATLAS Collaboration], “Measurement of the top pair production cross section in 8 TeV proton-proton collisions using kinematic information in the lepton+jets final state with ATLAS,” Phys. Rev. D **91**, no. 11, 112013 (2015).
- V. M. Abazov *et al.* [D0 Collaboration], “Improved b quark jet identification at the D0 experiment,” Nucl. Instrum. Meth. A **763**, 290 (2014).
- A. Khanov [ATLAS Collaboration], “Beyond-the-Standard Model Higgs Physics using the ATLAS Experiment,” EPJ Web Conf. **71**, 00067 (2014).
- G. Aad *et al.* [ATLAS Collaboration], “Measurement of the top quark pair production cross-section with ATLAS in the single lepton channel,” Phys. Lett. B **711**, 244 (2012).
- G. Aad *et al.* [Atlas Collaboration], “Measurement of the top quark-pair production cross section with ATLAS in pp collisions at $\sqrt{s} = 7$ TeV,” Eur. Phys. J. C **71**, 1577 (2011).
- T. Aaltonen *et al.* [CDF and D0 Collaboration], “Combined CDF and D0 Upper Limits on Standard Model Higgs Boson Production with up to 8.2 fb^{-1} of Data,” arXiv:1103.3233 [hep-ex].
- V. M. Abazov *et al.* [D0 Collaboration], “ b -Jet Identification in the D0 Experiment,” Nucl. Instrum. Meth. A **620**, 490 (2010).
- G. Aad *et al.* [ATLAS Collaboration], “Expected Performance of the ATLAS Experiment - Detector, Trigger and Physics,” arXiv:0901.0512.
- V. M. Abazov *et al.* [D0 Collaboration], “A Combined search for the standard model Higgs boson at $\sqrt{s} = 1.96\text{-TeV}$,” Phys. Lett. B **663**, 26 (2008).

- A. Khanov [D0 Collaboration], “Searches for standard model Higgs boson at the D0 detector at the Tevatron,” AIP Conf. Proc. **903**, 121 (2007).
- V. M. Abazov *et al.* [D0 Collaboration], “Search for associated Higgs boson production $WH \rightarrow WWW^* \rightarrow \ell^\pm \nu : \ell'^\pm \nu' + X$ in $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV,” Phys. Rev. Lett. **97**, 151804 (2006).
- V. M. Abazov *et al.* [D0 Collaboration], “Measurement of the $t\bar{t}$ production cross section in $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV using lepton+jets events with lifetime b -tagging,” Phys. Lett. B **626**, 35 (2005).