Shota Tsiskaridze

Curriculum Vitae

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Work Experience

2020–Current **Associate Professor at Ilia State University (Tbilisi, Georgia)**

Since March 2020, I have held the position of an Associate Professor at Ilia State University. In this capacity, I serve as the head of the Software Engineering Master's Program and also fulfill the role of Scientific Director at the Computing Center within the School of Technology, which is part of the Faculty of Business, Technology, and Education. Furthermore, I have the responsibility of instructing courses in the following subjects:

- Programming in Python (Geo);
- Data Analysis Using Python (Geo);
- Computational and Statistical Methods for Electrical Engineers (Eng);
- Algorithms and Data Structures (Eng);
- Elements of Computational Complexity (Eng).

In addition to my teaching duties, I supervise master's theses.

2020–2022 **Adjunct Professor at San Diego State University Georgia (Tbilisi, Georgia)**

From August 2020 to June 2022, I worked as an adjunct professor at San Diego State University (Georgian Campus). During this period, my responsibilities included teaching the following courses:

- Machine Learning (Eng);
- Artificial Intelligence (Eng);
- Algorithms and Their Analysis (Eng).

2020–2021 **Data Analyst in the project "CARYS 19-1287" (Tbilisi, Georgia)**

From July 2020 to December 2021, I worked in the "Georgian Language Processing API" project as a data analyst.

2013–2016 **Researcher at Instituto de Física de Altas Energías (Barcelona, Spain)**

From September 2012 to June 2016, I was a member of the IFAE Experimental Group and actively involved in ATLAS data analysis on the Large Hadron Collider (LHC).

Research Experience

2012–2016 **ATLAS Data Analysis**

In September 2012, I embarked on my journey as a Ph.D. student by joining the IFAE Experimental Group, where my primary focus was on ATLAS data analysis. Specifically, my research centered around top-quark physics and the quest for new phenomena. The core topic of my Ph.D. involved the exploration of the rare FCNC decay of a top quark, denoted as $t \to Hq$ (where q can be either u or c) ($q = u, c$), with H subsequently decaying into $b\bar{b}$. This analysis was an integral part of the ATLAS FCNC searches and primarily targeted the semileptonic FCNC decay of the $t\bar{t}$ system $t\bar{t} \to WbHq$, with $W \to \ell\nu$ and $H \to b\bar{b}$. In this analysis I studied various topics, such as:

- Search for new physics in final states containing a large number of b-jets;
- Development of a novel method to build the powerful discriminant between signal and background;
- Conception and maintenance of tools for statistical interpretation of data analysis;
- Jet Charge identification based on the charge of the tracks inside the jet.

The results presented in my dissertation played a pivotal role in filling a significant gap in the search for $t \to Hq$ decays during Run 1 of the LHC, specifically by considering the dominant decay mode $H \to b\bar{b}$.

In recognition of the quality and significance of this research, my thesis was honored with the Springer Theses Award in 2017 and subsequently published as part of the book series "Springer Theses: Recognising Outstanding PhD Research" [1]. Furthermore, the work was published in JHEP 12 (2015) 061 [2] and presented at the 8th International Workshop on Top Quark Physics (TOP2015) [3].

Education

Springer Theses Award in Physics, *Awarded in September 2017,*
Published in the book series: "Springer Theses: Recognising Outstanding PhD Research"

2012–2016 **PhD in Experimental Particle Physics**,
Instituto de Física de Altas Energías/Universidad Autónoma de Barcelona
Excellent Cum Laude

Awarded June 2016

Supervisors Aurelio Juste Rozas (ICREA/IFAE)
Sebastian Grinstein (ICREA/IFAE)

Thesis Title **Search for Flavor-Changing Neutral Current Top Quark Decays $t \to Hq$, with $H \to b\bar{b}$, in pp Collisions at $\sqrt{s} = 8$ TeV with the ATLAS Detector**

My PhD research is conducted in the field of high-energy physics and is devoted to solving the well-known *flavour puzzle*, which helps to discover new physics or probe it before it is directly observed in experiments. Namely, it focuses on the search for a flavor-changing neutral currents (FCNC) in the decay of a top quark to an up-type quark ($q = u, c$) and the Standard Model Higgs boson, where the Higgs boson decays to the $b\bar{b}$. The search is based on pp-collision data recorded at $\sqrt{s} = 8$ TeV in 2012 with the ATLAS detector at the CERN Large Hadron Collider. Data are analyzed in the top quark pair events in the lepton+jets final state. The search exploits the high multiplicity of b jets characteristic of signal events, and employs a likelihood discriminant that uses the kinematic differences between the signal and the background. To improve the sensitivity of the search I developed a novel approach to construct the suitable discriminating variable between the signal and background. The results presented in the thesis constitute the most sensitive bounds on tqH interactions at the moment of publishing.

2010–2012 **Master in High-Energy physics, Astrophysics and Cosmology**,
Instituto de Física de Altas Energías/Universidad Autónoma de Barcelona

Awarded February 2012

Thesis Title **Beam Test Performance of 3D Pixel Detector for the IBL Upgrade**

The Master's Thesis focuses on the characterization and qualification of the 3D pixel technology for the upgrade of the pixel detector of the ATLAS experiment (Insertable B-Layer, or IBL upgrade). During this work a significant progress has been made in the development of 3D sensors for pixel detectors, which culminated in the sensor production for the ATLAS IBL detector carried out at CNM (Barcelona, Spain) and FBK (Trento, Italy).

2007–2009 **Master in Applied Mathematics and Physics**,
Moscow Institute of Physics and Technology (State University), Moscow, Russia

Awarded June 2009

Thesis Title **Application of Hilbert Space-Filling Curves to Numerical Modeling of the Problems of Mathematical Physics**

In the Master's Thesis I studied Cartesian meshes – a special class of computational meshes. The thesis presents an effective method of parallelization of computational processes on such meshes, based on the mechanism used in the construction of Hilbert's curves.

2002–2007 **Bachelor in Applied Mathematics and Physics**,
Moscow Institute of Physics and Technology (State University), Moscow, Russia

Publications

As a member of the ATLAS collaborations, I am a co-author of over 580 refereed publications from 2012 – current, those with the most significant contributions are included below:

[1] S. Tsiskaridze, *Search for flavour-changing neutral current top quark decays $t \to Hq$ in pp collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector*, Springer Theses, Springer, 2017.

[2] ATLAS Collaboration, G. Aad et al., *Search for flavour-changing neutral current top quark decays $t \to Hq$ in pp collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector*, JHEP **12** (2015) 061, arXiv:1509.06047 [hep-ex].

[3] On behalf of the ATLAS Collaboration, S. Tsiskaridze, *Search for flavour-changing neutral current top quark decays $t \to Hq$ in pp collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector*, PoS(TOP2015)30 (Proceedings of Science, TOP2015). http://pos.sissa.it/cgi-bin/reader/contribution.cgi?id=257/030.

[4] ATLAS IBL Collaboration, J. Albert et al., *Prototype ATLAS IBL Modules using the FE-I4A Front-End Readout Chip*, JINST **7** (2012) P11010, arXiv:1209.1906 [physics.ins-det].

[5] S. Grinstein and S. Tsiskaridze, *Beam Test Results of the CNM 3D Devices for the ALTAS-IBL Detector*, Tech. Rep. ATL-COM-INDET-2012-010, CERN, Geneva, Feb, 2012. https://cds.cern.ch/record/1423634.

[6] V. Bobkov, T. Kozubskaya, S. Tsiskaridze, and D. Zvenkov, *On Locally Refined Mesh Processing for Parallel CFD*, International Conference NUMGRID2008 (Moscow 2008).

Talks at Conferences and Workshops

2015 TOP2015 - 8^{th} International Workshop on Top Quark Physics – Young Scientists Forum – *Search for flavour-changing neutral current top quark decays $t \to Hq$ in pp collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector*

2011 19^{th} RD50 Workshop on Radiation hard semiconductor devices for very high luminosity colliders – *Testbeam results of CNM 3D FE-I4 devices*

Scholarships

2013-2016 *AGAUR FI fellowship 2013* (research training scholarship)

2003 *The President of Georgia Annual Scholarship*

Computer Skills

O/S	Linux, Windows, MacOS
Programming	C/C++, Python, T-SQL, LaTeX
Web	HTML, CSS, PHP, JavaScript
Databases	SQL Server, SSMS, SSIS
Cloud Services	Amazon Web Services (AWS)
Others	ROOT, Joomla

Languages

Fluent in English, Georgian, Russian. Beginner level Spanish and French.

Awards and Certificates

- *AWS Certified Cloud Practitioner certification (December 2021)*
- *Springer Theses: Outstanding PhD Research Recognition (2017)*
- *Honorable Mention at the 43^{th} International Mathematical Olympiad* (Great Britain, Glasgow) (2002)
- *Second Prize, First Open Russia Junior Pilot Contest* (Russia, St. Peterburg) (2000)
- *Honorary Mention at the Mediterranean Mathematical Competition* (2000)
- *Certificate of achievement of the "ThinkQuest" educational Internet challenge contest* (1999)