

# Sergo R. Jindariani

---

Fermilab  
P.O.Box 500  
MS 318  
Batavia, IL 60510-0500

Phone: (630) 840-2433  
Fax: (630) 840-8859  
[sergo@fnal.gov](mailto:sergo@fnal.gov)  
<http://www.fnal.gov/~sergo/>

## Professional Experience

2012 Jul - current, Wilson Fellow, Fermi National Accelerator Laboratory  
(CMS experiment and generic R&D for future trigger systems)

2007 Nov - 2012 Jul, Research Associate, Fermi National Accelerator Laboratory  
(CMS and CDF experiments)

2003 May - 2007 Nov, Research Assistant, University of Florida  
(CDF experiment)

2001 Sep - 2002 Aug, Undergraduate Research Assistant, Joint Institute for Nuclear Research  
(Dubna, Russia)

## Education

Ph.D. Physics, University of Florida, Gainesville, FL 2007  
Dissertation: "Fragmentation of jets produced in  $p\bar{p}$  collisions at  $\sqrt{s}=1.96$  TeV"

B.S. Physics, Tbilisi State University, Tbilisi, Georgia 2002, *Summa Cum Laude*

## Research Highlights

### Trigger R&D 2012–current:

- development of 2D and 3D associative memory chips for high-speed pattern recognition in future trigger systems.
- Advanced Telecommunications Computing Architecture (ATCA) based solution for high-speed data processing and formatting in future trigger systems.

### CMS experiment, 2010–current:

#### **CMS Level-1 Trigger Upgrade**

- USCMS Upgrade Project Task Force. Project Management for the Level-1 trigger Phase-1 upgrade.
- Emulation of the performance of the Level-1 trigger system for the Phase-1 upgrade.
- Level-1 trigger upgrade Technical Design Report (TDR) and USCMS upgrade project Conceptual Design Report (CDR).

#### **Higgs Physics**

- Searches for the Standard Model Higgs boson in diboson decay modes.
- Observation of the SM Higgs-like boson in the WW decay channel.
- Exclusion of the SM Higgs boson in the mass range 115-600 GeV in WW and ZZ decay channels.
- Measurements of WW and ZZ cross-sections - milestones on the way to the Higgs discovery.

#### **Top Physics and Scalar Top searches**

- Studies of top quark properties in fully leptonic final state.
- Measurement of the forward-backward asymmetry in top-antitop events.

- Measurements of t-tbar spin correlations and top quark polarization.
- Search for super-symmetric scalar top pair production in lepton + jets final state.

### **Tracking/Vertexing**

- Efficiency and resolution of primary vertex reconstruction using data-driven methods.
- Studies of tracking anomalies in muons/tracks with early CMS data.

### **CDF experiment, 2004–2013:**

#### **Co-convenor of the Higgs→WW/Higgs→ZZ group**

- Coordinated, guided and reviewed searches for a high-mass Standard Model Higgs boson.
- Coordinated, guided and reviewed measurements of diboson cross-sections.
- Led CDF contributions to the Tevatron exclusion of the Higgs boson.

#### **Higgs Boson and Electroweak Physics**

- Searches for a Standard Model Higgs Boson in the  $H \rightarrow WW$  and  $H \rightarrow ZZ$  channels.
- Measured  $WW$ ,  $WZ$  and  $ZZ$  cross-sections in leptonic final states.

#### **Co-Leader of CDF silicon project**

- Coordinated operation of the CDF silicon tracker.
- Lead repairs of the ISL cooling system in 2009.
- Studies of CDF silicon tracker aging in radiation environment.
- Studied effects of detector aging on the performance of vertex reconstruction in the online trigger and offline tracking.
- Measurements of irradiated silicon annealing.

#### **Cherenkov Luminosity Counter**

- Operation of the Cherenkov Luminosity Counter (CLC) detector system in Run II.
- Testing and installation of the hardware components, studies of the CLC PMT gain stability, support and development of CLC online and offline software.

#### **Studies of soft QCD and jet fragmentation**

- Driving force in jet fragmentation and soft QCD studies at CDF. Established and led a broad program of jet fragmentation studies at CDF. This research advanced our understanding of the relative roles of perturbative and non-perturbative domains of Quantum Chromo-Dynamics in forming the main characteristics of quark and gluon jets.

## Committee work

USCMS Phase-II Upgrade R&D Steering Committee (2013-current)

Fermilab Science and Technology review preparation committee (2013).

Fermilab CMS-department research associate hiring committee (2012-current).

Career event at Fermilab (Organizer, 2013).

Elected by Fermilab users community to serve on Fermilab Users Executive Committee (UEC). UEC focuses on providing Fermilab users with resources necessary to conduct fundamental research at the lab, plays active role in government relations and organizes annual UEC meetings (2011-2013).

Fermilab UEC Quality of Life and Non-US users committee (Chair, 2012-2013).

Fermilab UEC Government Relations sub-committee (2011-2012).

Fermilab Annual Users Meeting organizing committee (2012-2013).

## Outreach

Represented Fermilab at the STEM Career Symposium (Fermilab, 2012)

Ask a Scientist: available to answer questions from the public at Wilson Hall (Fermilab, 2010)

Tours of CDF collision hall to Fermilab employees (Fermilab, 2009).

Saturday Morning Physics: tours of Fermilab facilities (CDF, D0, MIPP) for high school students (Fermilab, 2007–2009).

Judged USA national Young Physicist Tournament (Jacksonville, FL, 2004).

Helped to train national team for the International Young Physicist Tournament (Georgia, 1999).

Judged national Young Physicist Tournament (Georgia, 1999).

Preparation and organization of regional and national level physics Olympiads for high school students (Georgia, 1997-1998).

## Teaching and Mentorship

**Mentorship:** I have a history of success at directing many postdocs, graduate, undergraduate and high school students on research projects in experimental particle physics. The full list including research topics and their current positions is available upon request.

**2002–2003: Teaching Assistant, Department of Physics, University of Florida.** Taught discussion and laboratory sessions for “Introductory Physics” and “Physics with Calculus” undergraduate courses.

**2002–2003 Private Tutor, Department of Physics, University of Florida.** Assisted undergraduate students in improving academic achievements by clarifying physics problems and helping to solve them.

## Technical Experience

System Administrator, Geonet (Internet Service Provider), 08/1998–05/1999

Administered and upgraded Linux based ISP system, implemented IP-telephony service.

## Honors and Awards

Red Diploma (summa cum laude), Tbilisi State University 2001

Recipient of George Soros Scholarship for outstanding students 1997-2000

Recipient of Georgian President thank you letter for academic excellence and leadership, 1997

Third prize, International Young Physicist Tournament 1996,1997

Silver medalist, National Mathematics Olympiad 1995,1996

Bronze medalist, National Physics Olympiad 1997

## Conference and Seminar Presentations:

### Higgs and EWK Physics:

#### “H→WW at CMS”

- University of Chicago Symposium on Higgs Physics in LHC era., November 2012.

#### “Searching for Higgs: from Tevatron to the LHC”

- Northeastern University seminar, February 2012.
- Fermilab LHC Physics Center seminar, March 2012.

#### “Searches for Higgs Boson at the Tevtron”

- Michigan State University, High Energy Physics seminar, October 2011

#### “Higgs Searches at the LHC”

- Report at the CDF Higgs workshop, September 2011

#### “The Higgs Boson – on the Road to Discovery”

- University of Alabama, Physics Department Colloquium, March 2011
- Lawrence Berkeley National Laboratory RPM seminar, February 2011
- Northwestern University, High Energy Physics seminar, January 2011

#### “Search for the Higgs”

- Tevatron 25th Anniversary Symposium, Fermilab, December 2010

#### “Neural Networks, Backgrounds and Systematics”

- Annual Higgs Systematics Workshop, Fermilab, May 2010

#### “Searches for heavy Higgs boson at the Tevatron”

- Spring Symposium on Higgs Physics, University of Michigan, May 2010

#### “High mass Higgs at the Tevatron”

- Hadron Collider Physics Symposium, Evian, France, November 2009

#### “Road to SM Higgs boson sensitivity at CDF”

- Fermilab Joint Theoretical-Experimental Seminar (“Wine and Cheese”), FNAL, Batavia, IL, March 2009

### QCD Physics:

#### ”Soft QCD and the Underlying Event at the Tevatron”

- XVII International Workshop on Deep-Inelastic Scattering and Related Subjects, Madrid, Spain, April 2009

#### “Studies of jet fragmentation at CDF”

- UCSB High Energy Physics Seminar, Santa Barbara, CA, July 23 2007

#### “Jet fragmentation at CDF”

- Fermilab Research Associate Seminar, Batavia, IL, July 17 2007

#### “Soft QCD and the underlying event”

- Hadron Collider Physics Symposium, La Biodola, Isola d’Elba, Italy, May 20-26 2007

#### “Jet Fragmentation at CDF”

- APS 2007 April Meeting, Jacksonville, FL, April 14-17 2006

#### “New Jet Fragmentation Results at Tevatron”

- International Symposium on Multiparticle Dynamics, Rio de Janeiro, Brazil, September 02-08, 2006
- PHENO’06 Symposium, Madison, WI, May 15-17, 2006

#### “Two-particle Momentum Correlations in Jets at Tevatron”

- APS 2006 April Meeting, Dallas, TX, April 22-25, 2006
- SEAPS 2005 Meeting, Gainesville, FL, November 10-12, 2005
- Panic’05, Santa Fe, NM, October 27, 2005

**Detector Talks:**

**“Longevity Studies and Operational Experience with the CDF Run II silicon detectors”**

- Vienna Conference on Instrumentation, Vienna, Austria, February 2010

**“CDF Luminosity Studies”**

- Joint CDF/D0/AD Luminosity Meeting, FNAL, Batavia, IL, November 1, 2005

Large number of presentations in CDF and CMS internal meetings.

## Publications with primary authorship

Here is a list of publications and conference proceedings in which I have made major contributions in the form of analysis technique and/or student mentorship.

### Published and submitted:

#### Higgs Physics:

- [1] “**Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC**”, Phys. Lett. B716 (2012) 30-61.
- [2] “**Search for the standard model Higgs boson decaying to a W pair in the fully leptonic final state in pp collisions at  $\sqrt{s} = 7$  TeV**”, Phys. Lett. B710 (2012) 91-113.
- [3] “**Search for the standard model Higgs boson in the H to ZZ to  $2l2\nu$  channel in pp collisions at  $\sqrt{s} = 7$  TeV**”, JHEP 1203 (2012) 040.
- [4] “**Higgs Boson Studies at the Tevatron**”, Phys. Rev. D88 (2013) 052014.
- [5] “**Combination of searches for the Higgs boson using the full CDF data set**”, Phys. Rev. 88 (2013) 052013.
- [6] “**Searches for the Higgs boson decaying to W+W- with the CDF II detector**”, Phys. Rev. D88 (2013) 052012.
- [7] “**Novel inclusive search for the Higgs boson in the four-lepton final state at CDF**”, Phys. Rev. D86 (2012) 072012.
- [8] “**Combination of Tevatron Searches for the Standard Model Higgs Boson in the WW Decay Mode**”, Phys. Rev. Lett. 104, 061802 (2010).
- [9] “**Combined Tevatron Upper Limit on  $gg \rightarrow H \rightarrow W^+W^-$  and Constraints on Fourth-Generation Fermion Models**”, Phys. Rev. D. 82, 011102(r) (2010).
- [10] “**Inclusive Search for Standard Model Higgs Boson Production in the WW Decay Channel Using the CDF II Detector**”, Phys. Rev. Lett. 104, 061803 (2010).
- [11] “**Search for a Higgs Boson Decaying to Two W-bosons in  $p\bar{p}$  Collisions at the Center-of-Mass Energy  $\sqrt{s} = 1.96$  TeV**”, Phys. Rev. Lett. 102, 021802 (2009).

#### Electroweak Measurements:

- [12] “**Measurement of W+W- and ZZ production cross sections in pp collisions at  $\sqrt{s}=8$  TeV**”, Submitted to Phys. Lett. B.
- [13] “**Measurement of ZZ Production in leptonic final states at 1.96 TeV at CDF**”, Phys. Rev. Lett. 108 (2012) 101801.
- [14] “**Measurement of the WZ Cross Section and Triple Gauge Couplings in  $p\bar{p}$  Collisions at 1.96 TeV**”, Phys.Rev. D86 (2012) 031104. 101801.
- [15] “**Measurement of the  $W^+W^-$  Production Cross-Section and Search for Anomalous  $WW\gamma$  and  $WWZ$  Couplings in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.96$  TeV**”, Phys. Rev. Lett. 104, 201801 (2010).

## Top and QCD Measurements:

- [16] **“Measurements of t t-bar spin correlations and top-quark polarization using dilepton final states in pp collisions at 7 TeV”**, submitted to PRL.
- [17] **“Charge Asymmetry Measurements in Top Dilepton Events in pp Collisions at s = 7 TeV”**, in preparation for JHEP.
- [18] **“Measurement of Event Shapes in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.96$  TeV”**, Phys. Rev. D. **83**, 112007 (2011).
- [19] **“Measurement of the  $k_T$  Distributions of Charged Particles in Jets Produced in  $p\bar{p}$  Collisions at the Center-of-Mass Energy  $\sqrt{s} = 1.96$  TeV”**, Phys. Rev. Lett. **102**, 232002 (2009).
- [20] **“Two-particle Momentum Correlations in Jets Produced in  $p\bar{p}$  Collisions at the Center-of-Mass Energy  $\sqrt{s} = 1.96$  TeV”**, Phys. Rev. D. **77**, 092001 (2008).

## Detector Papers:

- [21] **“CMS Technical Design Report for the Level-1 Trigger Upgrade”**, CERN-LHCC-2013-011 ; CMS-TDR-12.
- [22] **“Description and performance of track and primary vertex reconstruction with the CMS tracker”**, in preparation.
- [23] **“Operational Experience with CDF II Silicon Detectors”**, Nuclear Inst. and Methods in Physics Research, A **729** (2013) 153-181.
- [24] **“Measurement of annealing properties of irradiated silicon using CDFII silicon detectors”**, for Nuclear Instrumentation Methods A.

Primary author of over 100 public and internal CDF and CMS notes (full list available upon request).  
Co-author of more than 400 journal publications with over 10000 citations.