

*Curriculum Vitae***Simona Rolli**

U.S. Department of Energy
 SC-25/Germantown Building
 1000 Independence Ave., SW
 Washington, DC 20585
 Phone: +1 301 903 0504
 Simona.Rolli@science.doe.gov

RESEARCH INTERESTS

Collider Physics, Searches for Physics Beyond the Standard Model; QCD Phenomenology; Data Handling and Distributed Analysis, Data Monitoring and Data Validation; Detector Simulation.

EDUCATION

- University of Pavia, Italy PhD in Physics, 1996
- University of Pavia, Italy Laurea in Physics, 1992 (Summa Cum Laude)
- Conservatory of Music of Vicenza, Italy Diploma in Piano, 1987

POSITIONS HELD

- Program Manager, US Department of Energy, Office of High Energy Physics
- Senior Research Associate, Tufts University, Medford, MA 1999-2011
- Research Associate, Tufts University, Medford, MA 1997-1999
- Visiting Research Scholar, Lawrence Berkeley Laboratory, Berkeley, CA 1996
- Visiting Scholar, Fermilab Theory Division - 1995
- Visiting Scholar, NASA/Fermilab Astrophysics Center 1994

EXPERIENCE**RESEARCH**

- 2009-2010 - Leader of a CDF group focusing on searches for new non-SUSY particles overseeing the following analyses:
 - Search for resonances decaying into multijets
 - Search for fermiophobic Higgs
 - Search for W' to $e\nu$
 - Search for Z' into $\mu\mu$
 - Search for Anomalous Production of photon + jets
 - Search for resonances decaying into ZZ
 - Search for RS graviton in $\gamma\gamma$ decay
 - Search for new physics in complex final states including a lepton, b-jet, photon and missing transverse energy.

- Since 2009 Principal author of an ATLAS analysis on searches for Higgs production in Leptogenic SUSY models
- Since 2007 - Co-author of the *Review of Particle Physics (mini-review on Leptoquarks)*
- 2004-2005 - ATLAS physics studies

Performed studies on leptoquark sensitivity reach and b-tagging performance in single top analyses. The results were presented at several ATLAS workshops.

- Since 2002 - Leader of the CDF analysis effort in the search for leptoquarks at CDF Run II

The search for first generation leptoquarks was one of the first exotic analyses pursued with early CDF Run II data. It was selected because the signature of energetic electrons and jets could be swiftly understood and then expanded to include more complex final states, while the understanding of the detector evolved from a commissioning phase to a steady running phase. The analysis was one of the first approved by the collaboration, superseding the previous results from Run I. It was published in 2005. Since then, the effort was extended to include different decay modes and second and third generation leptoquark searches. The expertise gained was used to guide several students from Tufts and Pisa toward their theses at the undergraduate and graduate level.

- 2001-2002 - Leader of the CDF New Particles Search (Exotics) Physics Group in the early phase of Run II, overseeing the following analyses:

- Search for resonances in dilepton final states
- Search for resonances in dijet final states
- Search for charged massive objects (CHAMPS)
- Search for doubly charged Higgs
- Follow up on Run I anomalies (new physics in diphoton final state)
- Search for SUSY in B_s into muon-muon
- Search for SUSY in chargino-neutralino (Run I data)
- Search for Extradimensions in MET + jets (Run I data)
- Search for extradimensions in dielectrons and diphotons (Run I data)
- Search for supersymmetric Higgs decaying into tau-tau (Run I data)
- Search for stop to dileptons, jets and MET (Run I data)
- Search for RPV sneutrinos (Run I data)

- 1996-1997 - Studies of QCD background to top mass determination

Study of the effect of gluon radiation in the determination of the correct jet energy scale used to measure the top quark mass.

- 1992-1995 - Studies of fragmentation phenomena in perturbative QCD

Fragmentation functions were derived from data fit for light and heavy quark production and used in calculating the production cross-section at NLO for light mesons and heavy flavor at fixed target experiment (E706), Tevatron and LHC energies. Such approach was compared with a parton shower approach, routinely used in the simulation of Monte Carlo events.

COMPUTING AND SOFTWARE

- 2009-2010 - Validation of CDF software releases on new Linux versions

As a member of the code management team, revised and updated test programs to validate the execution of CDF software on different platforms.

- Since 2007 - Architect and main developer of a suite of tools used across physics groups in CDF, aimed at automating the calculation of efficiencies and scale factors for data and Monte Carlo

With Run II entering a mature stage, it was recognized that the majority of analyses use similar procedures and selection criteria but often repeat common tasks like calculating selection efficiencies. Such redundancy should be eliminated to maximize the physics output. *PerfIDia* (Performance and ID instant answer) is a suite of tools that provides common efficiencies and scale factors and establishes a validation procedure, which is applied to data and Monte Carlo. It is used by all recently published CDF results. Analyses are streamlined, as common elements are made available centrally and in a coordinated fashion. The PerfIDia suite allows for monitoring of data quality and stability in quasi real time.

- 2001-2004 - Co-author of the evtNtuple analysis Ntuple in CDF

evtNtuple was the first complete standard Ntuple used across the CDF collaboration for the initial Run II data analysis. While more complex standard Ntuples were being developed, evtNtuple, as a flat representation of the event record living outside the CDF software environment, allowed for very quick data access and validation, reducing the latency related to the software development cycles of multiple releases and changes in object definition typical of an early stage experiment. Data were streamed immediately after offline reconstruction into evtNtuple and analyzed, decoupling data analyses from the software development of more complex physics objects.

- 1999-2006 - Leader of the CDF Trigger Simulation Group

TRGSim++ is a set of C++ packages that were developed to emulate the completely digital trigger at CDF II (L1 and L2). TRGSim++ is run online as the engine of the trigger monitor TRIGMON (in Control Room) and offline as an analysis tools to calculate rates and efficiencies.

- 1997-1998 - Author of several innovative studies on the use of object oriented databases as a storage system for CDF Run II data

Following ideas developed at CERN in previous years, the idea of separately storing different pieces of the event information on different media to optimize storage resources and data access was introduced at Fermilab. The idea of event splitting was later used in CDF when designing multibranch files residing on the same media. The ATLAS collaboration implemented the complete splitting of the event in different physical locations, using ROOT as the underlying storage technology and a relational database to manage metadata.

MANAGEMENT

- 2011 - present: Program Manager at the Office of Science, Office of High Energy Physics, for the following programs:
 - Theoretical Physics (March 2011- present)
 - Proton Accelerator Physics at the Energy Frontier (Acting, Jan 2012-Dec 2012)
 - LHC Operations (March 2011- Sept 2012)
 - LHC Detectors Upgrades (Sept 2012 - present)
- 2010 - 2011 Nominated Convener of the CDF New Particles Search (Exotics) Physics Group.
- 2009-2010 - Leader of a CDF group focusing on searches for new non-SUSY particles

Appointed to lead a group of about 30 people, involved in physics analyses aimed at searching for new particles predicted by leading theoretical models. The main task has been of coordinating and mentoring the analyzers activities, with the goal of expeditiously obtaining the approval of the results by the Collaboration and subsequent publication in peer-reviewed journals. This has been accomplished thanks to the broad experience gained while leading the Exotic Physics group of CDF in the early stage of Run II as well as the broad knowledge of the analysis tools used by the experiment. More than 70% of the analyses have been approved for public consumption outside the collaboration and the remaining are on track for approval by end of 2010.

- 2006-2007 - Co-convener of the group working on the ATLAS CSC note on Single Top

The CSC notes were produced by the ATLAS collaboration as a way to update the results presented in the Physics TDR published in 1999 regarding the physics reach and potential of the ATLAS detector. These new results made use of more realistic detector simulation and reconstruction algorithms. The appointment to be co-convener of the group, composed of about 40 people, followed previous activity in validation of the new simulation and in benchmarking of reconstruction algorithms.

- 2001-2002 - Leader of the CDF New Particles Search (Exotics) Physics Group

In the early stages of CDF Run II, the expertise in the new software tools and data access was recognized as a key component for the activity of leading one of the main four physics groups (comprising more than 100 people each) to obtain quick physics results. Signatures, which could be understood fast, were the first to be analyzed to pave the way for more complex ones. Traditional approaches were complemented by new signature-based investigations aimed at quickly confirm or exclude Run I anomalies.

Several preliminary results, which were the direct result of the oversight as Exotic Physics Group Convener, were presented in the 2003 Winter Conferences.

- **2000- Leader of the CDF High Level Objects Group**

Contributed to the definition of high level objects for physics analysis, estimate of access patterns and maximum size of event data for realistic early run scenarios. The group included about 30 people.

- **1999-2000 - Leader of the CDF Exotics Triggers/Datasets/Tools group**

Appointed to lead the group designing and implementing triggers optimized for new physics search and devising data access strategies to quickly get first results. This appointment was a result of the recognition of leadership in trigger simulation development and data access expertise. The group included about 30 people.

- **1999-2005 - Leader of the CDF Trigger Simulation Group**

Appointed to lead the effort of writing the complete trigger simulation for CDF Run II. Leading a group of about 40 people, mostly hardware experts with minimal software proficiency. The tasks of the leader were to provide a common software framework, deal with issues like data access and consistency of data flow between different modules and packages and to assure that all TRGSim++ was appropriately updated for different software releases.

ACADEMIC AWARDS AND FELLOWSHIPS

- Post Graduate Studies fellowship, awarded by Collegio Ghislieri, Pavia, Italy, (Collegio Ghislieri is one of the eleven University Colleges recognized by the Italian Ministry of University and Research as academic centers of excellence).
- Italian Ministry of University and Research Ph.D. scholarship (1992-1995).

STUDENTS

- Daniel Ryan - PhD, Tufts University, 2004
- Hao Sun - PhD, Tufts University, 2007
- Gabriel Dunn - Honor Thesis, Magna Cum Laude, Tufts University, 2008
- Stefania Vitillo - Honor Thesis, Summa Cum Laude, Universita' degli Studi di Pisa, Italy, 2010
- Matthew Vonhippel, Samuel Adelman, Tufts University, undergraduate project work

MISCELLANEA

- Elected member of the Fermilab Users Executive Committee (2004-2005) and organizer of the 2004 and 2005 Fermilab Annual Users' Meeting.
- Convener of the "Physics at highest Q² and p_t²" Working Group, for the International Workshop on Deep Inelastic Scattering (DIS2002), Krakow, May 2002.
- Organizers of TeVatron University at Fermilab, a series of seminars aimed at graduate students and young postdocs (2000-2001).
- Referee for Physical Review D, Review of Particle Physics (Particle Data Group), and internal referee for several CDF publications.
- Author of several presentations on particle physics to audiences of middle/high school students and associations not related to science.
- Approved for permanent residency in the US under the category of *Outstanding Researcher*, November 2000.

SELECTED TALKS

1. "New Physics Searches at the Tevatron" La Thuile, Aosta Valley, Italy, March 2011.
2. "Status of the Tevatron", Hadron Collider Physics Symposium, Toronto, Canada, August 2010.
3. "Recent Results from CDF and D0", PPC2010, Torino, Italy, July 2010.
4. "New Physics Searches at the Tevatron", PHENO 2010 Phenomenology Symposium, May 2010, Madison Wisconsin.
5. "QCD Results at the Tevatron" La Thuile, Aosta Valley, Italy, February 2010.
6. "Search for physics beyond the SM at the TeVatron", Fermilab Users' Meeting, June 2009.
7. "Search for physics beyond the SM at the TeVatron", invited talk at CIPANP 09, San Diego, May 2009.
8. "Results from the TeVatron", BNL Forum, BNL, November 2008.
9. "Search for BSM Physics at the TeVatron", Pheno 2008, Madison WI, April 2008.
10. "Top Physics at ATLAS", CTEQ Workshop on Early Physics at the LHC, Lake Gull, Michigan, May 2007.
11. "Top Physics at the LHC", Pascos Conference, Ohio State University, September 2006.

12. "B-tagging Performances", ATLAS North American Physics Workshop, Boston 2006.
13. "Single Top in Wt Channel", ATLAS Standard Model Workshop, Argonne, April 2006.
14. "Searches for BSM physics at the TeVatron", I.F.A.E., Pavia, April 2006.
15. "Single Top at Hadron Colliders", I.F.A.E., Pavia, April 2006.
16. "Recent Results at CDF", BNL HEP Seminar, January 2005.
17. "Search for Leptoquarks at Hadron Colliders", Tev4LHC workshop, Fermilab, September 2004.
18. "Recent Results from CDF High PT Physics", Fermilab Wine & Cheese Seminar, April 2004.
19. "Search for new particles at CDF II", Moriond ElectroWeak, 2003.
20. "Physics at High Q² and high PT²", Deep Inelastic Conference, Krakow, May 2002.
21. "Status of the CDF II experiment", LaThuile, March 2002.
22. "Run II Triggers for SM Higgs Searches", Snowmass, July 2001.
23. "Use of variable size arrays to model the ATLAS Raw data", Computing in High Energy Physics (CHEP2000), Padova, Italy, Febbraio 2000.
24. "The CDF Trigger System" Poster presented at a Computing in High Energy Physics (CHEP2000), Padova, Italy, Febbraio 2000.
25. "Search for new phenomena at the TeVatron", La Thuile, March 1999.
26. "Inclusive jet and dijets production at CDF", Physics in Collisions, Stony Brook, June 1997.
27. "Top Mass Measurement at CDF", Physics in Collision, Padova, May 1996.
28. "Fragmentation functions approach in perturbative QCD fragmentation phenomena", Moriond QCD, 1996.

PUBLICATIONS

- About 450 scientific publications in refereed journals as a member of the CDF and ATLAS Collaborations (Full list available from the Spires database). **Hirchs-index: 50** (as from Web of Science, isiknowledge.com, Thomson-Reuters)
- **Selected Publications for which I am one of the primary authors**
 1. C. Amsler et al. (Particle Data Group), "The Review of Particle Physics", Phys. Lett. B 667, 1, 2008 and 2009 partial update for the 2010 edition (K. Nakamura et al. (Particle Data Group), J. Phys. G 37, 075021 (2010)).
 2. S. Rolli, "Status of the Tevatron Experiments", Proceeding of the Hadron Collider Physics Symposium 2010, e-Print: arXiv:1010.0209 [hep-ex].

3. S. Rolli, “Recent QCD Results from the Tevatron”, Proceeding of the 24th Rencontres de Physique de la Valle d'Aoste: Results and Perspectives in Particle Physics, La Thuile, Valle d'Aoste, Italy, Mar 2010, to be published in Il Nuovo Commento C.
4. S. Rolli, “Searches for new physics at the Tevatron”, Proceeding of the 10th Conference on the Intersection of Particle and Nuclear Physics, AIP Conference Proceedings, Vol.1182, p. 156, 2009
5. CDF Collaboration, "Searches for second generation Leptoquarks at CDF Run II", Phys. Rev. D 73, 051102, 2006.
6. CDF Collaboration, "Searches for first generation Leptoquarks at CDF Run II", Phys. Rev. D 72, 051107, 2005.
7. S. Rolli, “Searches for new particles at CDF II”, Proceedings of 38th Rencontres de Moriond, Les Arcs, March 2003.
8. G. Moortgat-Pick, S. Rolli, A.F. Zarnecki, “Physics at large p_T and Q^2 ”, Acta Phys. Polon. B 33, 3955, 2002.
9. S. Rolli, “The status of the CDFII experiment”, Proceedings of the 16th Rencontres de Physique de la Valle d'Aoste: Results and Perspectives in Particle Physics, La Thuile, Valle d'Aoste, Italy, Mar 2001.
10. Monarc Collaboration, “Distributed applications monitoring at system and network level”, Comp. Phys. Comm. 140, 219, 2001.
11. S. Rolli et al., “Trigger Simulation at CDF”, Proceedings of CHEP 2000, INFN Padova, p. 250.
12. S. Rolli et al., “Atlas event data model optimization studies based on the use of segmented VArray in Objectivity/DB.”, Proceedings of CHEP 2000, INFN Padova, p. 436.
13. S. Rolli, “Searches for new phenomena at the Tevatron: SUSY and technicolor”, Proceedings of 13th Les Rencontres de Physique de la Valle d'Aoste: Results and Perspectives in Particle Physics, La Thuile, Valle d'Aoste, Italy, Mar 1999.
14. M. Cacciari, M. Greco, S. Rolli, A. Tanzini, “Charmed mesons fragmentation functions”, Phys. Rev. D 55, 2736, 1997.
15. S. Rolli, “Fragmentation functions approach in pQCD fragmentation phenomena”, Proceedings of 31st Rencontres de Moriond: QCD and High-Energy Hadronic Interactions, Les Arcs, France, Mar 1996.
16. S. Rolli, “Top mass measurement at CDF”, Proceedings of “Padua 1996, Hadron collider physics”, p. 449.
17. S. Rolli, “Light meson fragmentation functions”, Proceedings of “Minneapolis 1996, Particles and fields, vol. 1”, p. 599.
18. Mario Greco and Simona Rolli, “Light mesons production at the tevatron to next-to-leading order”, Phys. Rev. D 52, 3853, 1995

19. M. Greco, S. Rolli, A. Vicini, "Inclusive particle photoproduction to next-to-leading order", *Z. Phys. C* 65, 277, 1995.
20. E. Adelberger et al, "Kinematical probes of neutrino mass", *Proceedings of Snowmass Summer Study 1994*, p.195 .
21. S. Rolli "Transizioni di fase nel primo universo", *Scientifica Acta, I Quaderni del Dottorato, Pavia, Volume IX, N 2*, p. 77, 1994.
22. P. Chiappetta, M. Greco, J.P. Guillet, S. Rolli, M. Werlen, "Next-to-leading order determination of pion fragmentation functions", *Nucl. Phys. B* 412, 3, 1994.
23. M. Greco, S. Rolli, "Next-to-leading order eta production at hadron colliders", *Z. Phys. C* 60, 169, 1993.

• **Publications for which I provided oversight as a member of an internal CDF editorial Committee**

1. CDF Collaboration, "Search for ZZ and ZW production in ppbar collisions at $\sqrt{s}=1.96$ TeV", *Phys. Rev. D* 73, 052002, 2006.
2. CDF Collaboration, "Measurement of V+A Fraction in Top Decay at CDF at $\sqrt{s}=1.8$ TeV" *Phys. Rev. D* 71, 091105, 2005.
3. CDF Collaboration, "Observation of Orbitally Excited B Mesons in ppbar Collisions at $\sqrt{s}=1.8$ TeV", *Phys. Rev. D* 64, 072002, 2001.
4. CDF Collaboration, "Search for the charged Higgs boson in the decays of top quark pairs in the e tau and muon tau channels at $\sqrt{s}=1.8$ -TeV", *Phys. Rev. D* 62, 012004, 2000.
5. CDF Collaboration, "Measurement of the top quark mass and t anti-t production cross-section from dilepton events at the collider detector at Fermilab", *Phys. Rev. Lett.* 80, 2784, 1998.
6. CDF Collaboration, "The mu tau and e tau decays of top quark pairs produced in p anti-p collisions at $\sqrt{s}=1.8$ -TeV", *Phys. Rev. Lett.* 79, 3585, 1997.