

## Curriculum Vitae of Donatella Lucchesi

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**Born** February 29, 1964 in Lucca Italy

**Citizenship** Italian

### Academic Career:

October 2010 - present: Associate Professor at the University of Padova  
October 2006 - October 2010: Researcher at the University of Padova  
April 2005 – October 2006: Researcher at the Istituto Nazionale Fisica Nucleare (Padova)  
March 2001 – April 2005: Senior post-doctor at the University of Padova  
February 1999 – February 2001: Post-doctor at the University of Padova  
July 1995- July 1997: Post-doctor at Istituto Nazionale Fisica Nucleare (Pisa)  
October 1991- September 1994: PhD in Physics at the University of Catania  
July 1990: "laurea" in Physics at the University of Pisa  
July 1987: Summer student at Fermi National Laboratory  
July 1983: high school degree

### Research Activity Summary

#### 1989-1990

WA84 at the CERN SPS.

The aim of the experiment was the study of the hadron production and the decay of B meson produced by collisions of 26 GeV charged pions on nucleons target. The originality of the experiment was the use of a scintillating fiber device with high spatial resolution used both as vertex detector and as target. Donatella Lucchesi participated in the tests carried out on various types of targets to study and improve the physical and mechanical characteristics, items that constituted her "laurea" thesis. The test results have been published on NIM.

#### 1991-1994

CDF experiment, Tevatron collider at Fermilab, Pisa institution.

Donatella Lucchesi has participated in the muon detector upgrade and in the subsequent commissioning spending the major part of her time at Fermilab. The events collected during the first two years of data taking were used for "Measurement of the mixing frequency in the system  $B^0 - \bar{B}^0$ ", topic of her PhD thesis. At that time the mixing frequency was measured by LEP experiments and it was thought not possible at a hadron collider due to the high level of background. For the first time at hadron collider Donatella Lucchesi has measured this important parameter of the standard model,

opening the door to all the measurements based on proper time determination as for example CP violation measurements. The result was published on Physical Review D.

### **1995-1998**

CDF experiment, Pisa institution.

Donatella Lucchesi collaborated to the feasibility study of a scintillating fiber detector for the CDF detector upgrade. This device was supposed to replace the "Vertex Tracking Chamber" detector placed between the silicon vertex detector and central drift chamber. The proposal was in competition with a silicon strips detector, that was finally adopted. During 1998, Donatella Lucchesi collaborated with the experiment CLUE (Cherenkov Light Ultraviolet Experiment) which aimed to assess the relationship matter/antimatter in the universe through the study of the shower produced by the interaction of primary cosmic radiation with the atmosphere.

### **1999-2001**

CDFII experiment, Padova institution.

Donatella Lucchesi participates in the silicon vertex detector upgrade. In particular she worked on the placement of a new silicon layer directly on the beam pipe. The new detector improved the charged particles tracks reconstruction and in particular the resolution on the impact parameter. She also studied the possibility to use the information obtained from this detector in the trigger on the impact parameter, the Silicon Vertex Trigger (SVT). This new trigger was determinant for the real-time selection of particles such as B mesons that travel hundreds of microns before decaying.

### **2002-2007**

CDFII experiment, Padova institution.

Donatella Lucchesi participates in several Bs meson measurements. She was the main author of the analysis on the first measurement of the Bs  $\rightarrow$  DsPi branching ratio (BR). The result was published in PRL.

From 13 to 16 February 2002 she organized the subgroup *Interest of having precise determinations of b-hadron lifetimes* within the Workshop on the CKM unitarity triangle.

She actively participated in the measurement of the Bs mixing frequency through:

- Measurement of the average lifetime in the hadronic decay channel Bs  $\rightarrow$  DsPi;
- Determination of the primary vertex event by event;
- Selection of the data sample through a skimming procedure developed using grid technologies.

In the 2004, Donatella Lucchesi started to work on computing and data handling.

In particular, she developed together with other Italian colleagues, a system to reduce the amount of data collected by the trigger on impact parameter, SVT, in smaller datasets. This software infrastructure was developed with tools that later were used for the transition of the CDF analysis system based on the CAF (Central Analysis Farms) to

GRID. She collaborated to the porting of the CAF code to GRID. In this way CDF was able to exploit opportunist resources. The portal to the European resources, LcgCAF was in production in January 2007.

## **2008-2011**

CDFII experiment, Padova institution.

Donatella Lucchesi participate in the Level 2 calorimeter upgrade. Thanks to this new trigger it was possible to combine information from jets and tracks to improve the selection of b-quark jets. The data collected by this trigger was used to determine the b-quark jet energy scale, to search for low mass Higgs and new resonances with b-bbar final state.

Donatella Lucchesi participates in the Higgs boson search as supervisor of graduate students. The group activities focused on two main items. The first one consisted of a definition of a new strategy to increase the sensitivity of  $H \rightarrow WW$  and  $H \rightarrow ZZ$  decay modes and thanks to this for the first time after LEP CDF excluded a region of possible masses. The second one to extend the Higgs search to decay in tau leptons.

She also collaborated to the measurement of the ZZ di-boson production cross section which constituted the "laura" thesis of a student who then continued to work as a graduate student under the supervision of the Donatella Lucchesi.

In 2008 Donatella Lucchesi had funded a PRIN, Research Project of National Interest, "Study and implementation of new methods for b-jets identifications at hadronic colliders". Within the project she hired a research assistant who carried out analysis on search for new resonances in bb-bar final states.

Still in 2008 she presented an European project FP7-PEOPLE-IOF-2008: ITES, Innovative Tools for Event Selection in high energy physics. She was the scientific coordinator. The project was funded.

Donatella Lucchesi and the beneficiary of the project started an R&D project on the use of Graphic Processing Unit (GPU) for real time events selection.

## **2012-Present**

At the beginning of 2012 Donatella Lucchesi asked the LHCb collaboration to accept the University of Padova as new institution. In June, Padova was formally accepted as new institution. The group is in charge of the feasibility study for the use new computer architectures for the High Level Trigger. At the end of 2012 the group has expanded having now about 10 people and they also collaborate to the RICH upgrade.

In April 2013 Donatella Lucchesi presented a new project at call of the University of Padova for Project of University Interest "GPU based architectures for real time applications in experimental physics and beyond" which has been funded.

## **Committees and Commitments**

1999-2003            LEP Working group member

2004-2006	Heavy Flavor Averaging Group member
2005-2009	Coordinator of the Italian CDF computing
2006-present	PI of the CDF-Padova institutions
2007-2009	CDF computing and data handling co-head
2009-2011	Member of the INFN review panel for Atlas and CMS
2011	Member of the review panel of ATLAS and CMS Operations Program (DOE)
2011	Member of the review panel of Open Science Grid (OSG) (DOE)
2011-present	Chair of the INFN Computing review panel
2012-present	Member of the Computing Scrutiny Group CERN
2012	Member of the review panel of ATLAS and CMS Operations Program (DOE)
2012-present	PI of the LHCb Padova institution
2013-present	Member of the executive board of the department of physics and astronomy of the University of Padova
2013-present	Member of the CTS (Technical and Scientific Committee of CNAF-Tier1)

### Supervised Students

**Simone Pagan Griso:** *Study of  $B_s$  production at CDF II*

**Stefano Camarda:** *Study and development of algorithms aimed at the  $H \rightarrow b\bar{b}$  selection at CDFII*

**Matteo Bauce:** *ZZ production cross section measurement in the four lepton decay channel at CDF experiment*

**Stefano Gelain:** *Study of new technologies for real time events selection in hep experiments*

**Simone Pagan Griso, PhD:** *Searches for a High-Mass Higgs Boson Produced in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.96$  TeV.*  
*"14th annual URA Thesis Award"*

**Maria d'Errico, PhD:** *Search for a high-mass Higgs boson produced in  $pp\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV with an hadronic tau in the final state*

**Matteo Bauce PhD** *Study of the ZZ diboson production at CDF II*

### Major Conferences

1993 -Italian Physics Society

1995 -XXXth Rencontres de Moriond *B mixing, lifetimes and rare decays at CDF and D0*

-Hadron 95 *CDF Results on B Lifetimes and Mixing*

1996 -Invited talk at the Italian Physics Society *B Physics Results at CDF*

1997 -16th International Workshop on Weak Interactions and Neutrinos *Prospects for Observing CP Violation at the Tevatron*

- 1998 -III International Conference Hyperons, Charm and Beauty Hadrons *B Physics in Run II with upgraded CDF II*
- 2000 -Les Rencontres de Physique de la Vallee d'Aoste *Fully reconstructed Hadronic B decays at CDF*
- 2001 -KAON2001 International Conference on CP Violation *Future CDF/D0 B physics*
- 2002 -Workshop on the CKM unitarity triangle, “Interest of having precise determinations of b-hadron lifetimes”, talk *Delta Gamma/Gamma results review and future perspectives*
- 8th International Conference on B-Physics at Hadron machines *CDF - Secondary Vertex Trigger*
- 2003 -Workshop on the CKM Unitarity Triangle *Bs Physics and Prospects at the Tevatron*
- 2004 -32nd Conference on High Energy Physics, plenary talk *New results for heavy flavors and QCD tests at Tevatron*
- 2006 -First Workshop on Theory, Phenomenology and Experiments in heavy flavour physics *Bs Mixing at the Tevatron*
- IEEE *LcgCAF: CDF submission portal to LCG*
- 2007 -3rd International Conference on e-Science and Grid Computing *CDF Monte Carlo Production on LCG GRID via LcgCAF*
- 2008 -IFAE2008 Invited talk on *Results from the Tevatron*
- 2009 -CHEP09, 17th International Conference on Computing in High Energy and Nuclear Physics *CDF way to Grid*
- 2010 -ICHEP2010 35th International Conference on High Energy Physics *Standard Model high mass Higgs search at CDF*

Donatella Lucchesi is co-author of more than 700 articles on international reviews.

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