Dr. Chaouki Boulahouache

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Education

Ph.D. Physics — **August 2002**
Syracuse University — Syracuse, NY

M.S. Physics — **August 2002**
Syracuse University — Syracuse, NY

Diploma Student — **August 1997**
International Center for Theoretical Physics — Trieste, Italy

B.Sc. Physics — **June 1995**
Constantine University — Constantine, Algeria

Awards

Frontier Of Physics Conference Fellowship — **October 2002**

Scholarship: International Center for Theoretical Physics — **1996-1997**

Award Of Excellence from Constantine Univ. — **June 1995**

Language Skills

I can speak, listen, understand and communicate in the following languages: **English** and **French**.

Teaching Experience

Physics Laboratory Director and Instructional Assistant Professor of Physics — **2015 - now**
Texas A&M at Galveston — **Galveston, TX**
I taught algebra based physics I and II (PHYS201 and PHYS202) and calculus based physics I and II (PHYS218 and PHYS208). I am directing all physics laboratories:

1. Re-designed and wrote laboratory manuals for all Physics labs.
2. Responsible for and directing a number of graduate teaching assistants and post-docs who are assigned to teach physics labs every semester.

Adjunct Professor of Physics — **2014 - 2015**
Houston Community College — **Houston, TX**
I taught algebra based physics PHYS 1401 (Mechanics and Thermal Heat) and PHYS 1402 (Electricity and Magnetism). I also taught calculus based physics PHYS 2325 (Mechanics and Thermal Heat). Teaching tasks include both lectures and labs.

Adjunct Professor of Physics — **2014 - 2015**
San Jacinto College — **Houston, TX**
I taught University Physics I, PHYS 2425 (Mechanics and Heat) and University Physics II, PHYS 2426 (Waves, Electromagnetism and Light) during the summer sessions I and II at San Jacinto College. Teaching tasks include both lectures and labs.

Teaching Assistant **1997-2000**
Syracuse University **Syracuse, NY**
Teaching assistant for the following courses:

1. **Electricity, magnetism, mechanics and general experimental physics laboratories**.
2. **Mechanics recitation/tutorial**.

Instructor **1995-1996**
Constantine University **Cosntantine**
Instructor (recitation) for **applied mathematics** (Algorithms, Fortran 77).

Research Experience

Research Scientist **2009-2012**
Compact Muon Solenoid (CMS) Collaboration **Rice Univ., Physics & Astronomy Dept.**
I used **C++ object oriented programming** to analyze the experimental data to determine the trigger performance of one important detector namely the muon detector. These measurements constitute an important part of the Muon Detector Performance paper. The analysis code is now used as a **debugging tool** at CMS, to check for any hardware or firmware problems. I also studied the performance of the muon reconstruction for a specific class of muon pairs which are very close to each other. As a result of this study, I defined and implemented the best muon identification tools to efficiently reconstruct such events. This study is now published in the "Muon Reconstruction Performance" paper. I **Integrated** a Fortran based simulation program into an **object oriented C++ framework** (called CMSSW). Academically, I supervised undergraduate students from Rice Univ. during the summer research program.

Research Associate **2005-2009**
A Toroidal Lhc ApparatuS (ATLAS) Collaboration **Univ. of Pittsburgh, Physics & Astronomy Dept.**
During this period I led the efforts of the installation and commissioning of the receiver system for the Liquid Argon and Tile Calorimeters at CERN. I worked extensively on both hardware and software and led different projects:

- **Hardware**: I have expertise in **Flash Analog-to-Digital Converter (ADC)**, **VME multiplexer boards**, **custom made receiver boards**, **single Board Computers**, **Time-to-Digital Converter (TDC)** plus other different NIM modules for example: fan-in/fan-out, scaler etc...
- **Software**:
  1. **Signal Processing**: I used **C and C++** extensively to perform different tasks in order to create and integrate the Data Acquisition (DAQ) software for the receiver and monitoring boards into an object oriented C++ framework (called T/DAQ). This software is now used to monitor and collect the level1 trigger signals from the Calorimeter. Then, signal processing methods were used to determine the gains that need to be loaded into the Variable-Gain-Amplifiers of the receiver boards. This work was presented at the 16^{th} IEEE NPSS Real Time Conference, Beijing, China, and published in the April 2010 issue of Transactions on Nuclear Science, Vol. 57, Iss. 2, Part 1.
  2. **Simulation**: I used fully simulated data samples to perform physics analysis studies. This study was presented under the title: "Prospects for Early Discoveries in Final States with Dileptons and Jets: LRSM and Leptoquarks", at the 16^{th} International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY08), Seoul, Korea, 16-21 June 2008.
- **Elected Positions**:

1. I led the Liquid Argon Calorimeter-Level 1 trigger group (within the **Detector Operation & Hardware Performance** group).
2. I was appointed as a member of the Liquid Argon Calorimeter Steering Group, which is entitled to take important decisions.

Academically, I supervised graduate students from different universities namely Univ. of Pittsburgh (USA), Columbia Univ. (USA) and Saclay (France).

Research Associate **2002-2005**
B meson TeV (BTeV) Collaboration **Syracuse Univ., Dept. of Physics**
I was appointed to a **Level 3 Manager** for the mirror sub-system of the BTeV-RICH detector. I led the the research and development of the mirror system which included both hardware and software.

Research Associate **2002-2005**
Cleopatra (CLEO) Collaboration **Syracuse Univ., Dept. of Physics**
I participated in the analysis and data taking of the CLEO-c program at Cornell Univ.

Research Assistant **1998-2002**
BTeV Collaboration **Syracuse Univ., Dept. of Physics**
I developed a **LAB-VIEW** program to measure/record the I-V characteristics of the pixel sensors. And I used the **ISE-TCAD** simulation package to simulate the electric field distribution within the pixel detector sensor using different design criteria.

Research Assistant **1998-2002**
CLEO Collaboration **Syracuse Univ., Dept. of Physics**
Thesis: "Lepton Energy Moments, Operator Product Expansion And The CKM Parameter V_{cb}." Analysis procedure used the primary lepton momentum spectrum in $\bar{B} \to X\ell\bar{\nu}$ decays, for $p_\ell \geq 1.5$ GeV/c in the B rest frame, to measure spectral momentum moments. These moments are used to determine the Heavy Quark Expansion parameters $\bar{\Lambda}$ and λ_1, which have direct impact on the measurement of $|V_{cb}|$ and the short range b-quark mass. I was also actively involved in the construction of the CLEO-III RICH detector, and the implementation of the RICH geometry using GEANT.

Diploma Student **1996-1997**
Trieste, Italy **International Center for Theoretical Physics**
Thesis: "One Loop Effects In Various Dimensions And D-Branes"

Computer Skills

Simulation Packages: I used different simulation packages such as the detector simulation package **GEANT** which simulates the interaction of radiation with matter. It is used in radiotherapy and particle physics. And the semi-conductor simulation package **ISE-TCAD**.

Languages: I have worked extensively with: Fortran 77, UNIX Scripting, Lab-VIEW, LaTeX 2_ε, C and C++ and JAVA.

Platforms: LINUX, Microsoft Windows/DOS, MAC OS.

Object Oriented Data Analysis Framework.

Analysis Tools: Analysis tools/plotting packages: PAW, MNFIT, ROOT, RooFit, RooStat (Statistics) and Microsoft Excel.

Machine Skills

I have worked on a number of machines:

1. Bridgeport J-Head Milling Machines with digital readout
2. Rockwell/Delta Drill Press & Do ALL Contourmatic Bandsaw
3. Milwaukee Model H Horizontal Milling Machine
4. Cabinet Bead Blaster

Talks And Conferences

Seminar at Texas A&M at Galveston, Galveston, Texas, USA — **March, 2018**
"Particles and our understanding of Matter: Latest Piece of the Puzzle"

Seminar at the Jefferson Lab, Newport News, VA, USA — **January, 2013**
"Trigger Primitives of the ATLAS Calorimeter and CMS Muon Endcap Detectors."

2012 IEEE Nuclear Science Symposium, Anaheim, CA, USA — **Oct./Nov., 2012**
Poster presentation: "Beamstrahlung Radiation for Beam-Beam Instability". Paper to appear in the Transactions on Nuclear Science (TNS).

CMS Physics Week, Bodrum, Turkey — **September, 2010**

16th IEEE NPSS Real Time Conference 2009, Beijing, China — **May, 2009**
"The ATLAS LAr Calorimeter Level 1 Trigger Signal pre-Processing System: Installation, Commissioning and Calibration Results."

Seminar at the Physics and Astronomy Dept. at Rice Univ., Houston, Texas, USA — **March, 2009**
"Atlas LAr Calorimeter and Prospects for early discoveries of the Heavy Right-Handed W's and Majorana Neutrinos."

LArg Week, Marrakech, Morocco — **February, 2009**
I gave two talks: (1) Report on L1 Activities and (2) L1 CALO Trigger.

Signaling the Arrival of the LHC Era, International Center for Theoretical Physics, Trieste, Italy — **December, 2008**
Tutor for the ATLAS analysis software prepared over 4 sessions.

The 16^{th} International Conf. on Supersymmetry and the Unification of Fundamental Inter., Seoul, Korea — **June, 2008**
"Prospects for early discoveries in final states with dileptons, jets: LRSM and Leptoquarks"

US ATLAS Analysis Jamboree, Brookhaven National Laboratory (BNL), Upton, NY, USA — **May, 2007**
"The status of LRSM studies in dimuon channel"

International Center for Theoretical Physics School: Expecting LHC, Trieste, Italy — **Sept 2006**

ATLAS Physics workshop, Roma Tre Univ., Rome, Italy — **June 2005**

Seminar at the Univ. of Pittsburgh, Pittsburgh, PA, USA — **December 2004**
"Lepton Energy Moments, Operator Product Expansion and CKM Element $|V_{cb}|$."

APS Meeting, Philadelphia, PA — **April 2003**
"Measurement of lepton momentum moments in the decay $\bar{B} \to X\ell\bar{\nu}$ and determination of Heavy Quark Expansion parameters and $|V_{cb}|$."

Flavor Physics and CP Violation Conf., UPENN, Philadelphia, PA — **May 2002**

APS Meeting, Albuquerque, NM — **April 2002**
"The determination of Heavy Quark Expansion Parameters λ_1 and $\bar{\Lambda}$ from the inclusive lepton spectrum in B meson decay."

European Org. for Nuclear Research (CERN), Geneva, Switzerland — **2005-2012**
More than 67 ATLAS talks and 34 CMS talks given at CERN.

Publication List

List of selected CMS publications:

The performance of the CMS muon detector in proton-proton collisions at $\sqrt{s} = 7$ TeV at the LHC - CMS Collaboration. Jun 28, 2013. 101 pp. Published in JINST 8 (2013) P11002. CMS-MUO-11-001, CERN-PH-EP-2013-072.

Performance of muon reconstruction and identification in pp collisions at $\sqrt{s} = 7$ TeV - CMS Collaboration, JINST 7 (2012) P10002 arXiv:1206.4071 [physics.ins-det] CMS-MUO-10-004, CERN-PH-EP-2012-173.

Combined results of searches for the standard model Higgs boson in pp collisions at $\sqrt{s} = 7$ TeV - CMS Collaboration, Feb 2012. 23 pp. Published in Phys.Lett. B710 (2012) 26-48. CMS-HIG-11-032, CERN-PH-EP-2012-023.

I had also contributions to the "search for Dark matter using Lepton Jets", the "Search for Higgs Bosons decaying to Long-Lived Exotica in the Displaced Lepton Channel" and the "Measurement of the W polarization in semi-leptonic top-pair decays".

List of selected ATLAS publications:

C. Boulahouache,"The ATLAS LAr Calorimeter Level 1 Trigger Signal pre-Processing System: Installation, Commissioning and Calibration Results" Paper presented at the 16th IEEE NPSS Real Time Conference 2009, Beijing, China. ATLAS note: ATL-COM-LARG-2009-017, published in the April 2010 Issue of Transactions on Nuclear

Science. Vol. 57, Iss. 2, Part 1.

C. Boulahouache,"Prospects for Early Discoveries in Final States with Dileptons and Jets: LRSM and Leptoquarks," Published in AIP Conf.Proc.1078:584-586,2009, proceedings of the 16th International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY08), Seoul, Korea, 16-21 June 2008.

ATLAS Collaboration, "Expected Performance of the ATLAS Experiment, Detector, Trigger and Physics," CERN-OPEN-2008-020, Geneva, 2008, to appear.

N. J. Buchanan *et al.*, "ATLAS liquid argon calorimeter front end electronics", JINST 3 P09003 (2008), **doi: 10.1088/1748-0221/3/09/P09003**.

List of selected CLEO/RICH publications:

M. Artuso *et al.*, "Performance of a C(4)F(8)O gas radiator ring imaging Cerenkov detector using multi-anode photomultiplier tubes,"Nucl. Intrum. Meth. A **558**, 373-387 (2006). e-Print Archive: **physics/0505110**.

M. Artuso *et al.*, "The CLEO RICH detector,"Nucl. Intrum. Meth. A **554**, 147-194 (2005). e-Print Archive: **physics/0506132**.

A.H. Mahmood *et al.*, "Measurement of lepton momentum moments in the decay $\bar{B} \to X\ell\bar{\nu}$ and determination of Heavy Quark Expansion parameters and $|V_{cb}|$," Phys. Rev. D **67**,072001 (2003).

M. Artuso *et al.*, "Construction, Pattern Recognition And Performance Of The CLEO-III LIF-TEA RICH Detector,"Nucl. Intrum. Meth. A **502**, 91-100 (2003).

List of theory publications (International Center for Theoretical Physics):

Chaouki Boulahouache, George Thompson, "One Loop Effects In Various Dimensions And D-Branes," Int. J. Mod. Phys. A **13**, 5409-5424 (1998).

Complete list of more than 300 publications available upon request.