

Gabriel CHARLES

118 Avenue de la Dimancherie
91440 Bures-sur-Yvette
France

Tel.: (+033)6 27 12 14 71
Email: gabriel.charles@ijclab.in2p3.fr

-- PROFESSIONAL EXPERIENCE --

- 2018 – Now** Project leader and particle detector expert at French National Center for Scientific Research at IJCLab in Orsay. Head of the French gaseous detector network. Technical coordinator for the NuBall2 experiment and ALERT detector to be installed at JLab
- 2016 – 2018** Post-doctoral research associate at Old Dominion University, Virginia, United States. Developed a Radial Time Projection Chamber to study the neutron structure function in CLAS12.
- 2013 – 2016** Post-doctoral research associate at Institut de Physique Nucléaire d'Orsay (IPNO), France. Developed and installed an electromagnetic calorimeter for a dark matter experiment, HPS at JLab, Virginia. Worked on the development of a hyperbolic low energy (<150 MeV/c) drift chamber for experiments that will take place at Jlab.
- 2010 – 2013** Research Assistant at Centre à l'Énergie Atomique et aux Énergies Alternatives (CEA) at Saclay, France. Developed Micromegas detectors for the CLAS12 spectrometer at Jefferson Lab.
- 2010** Research internship of four months at the State University of Saint-Petersburg, Russia for « ROOT-based analysis of experimental data from hadron production at ALICE, CERN».
- 2009** Three months internship at CERN working on the operating conditions of ALICE silicon pixel detector.

-- EDUCATION --

- 2010 – 2013** Ph.D. at Centre à l'Énergie Atomique et aux Énergies Alternatives (CEA) at Saclay, France.
- 2009 – 2010** Second year of Master Degree in subatomic physics (particle and nuclear physics) at University Claude Bernard Lyon 1, France.
- 2008 – 2009** First year of Master Degree at École Normale Supérieure of Lyon, France
- 2007 – 2008** Last year of Bachelor Degree at École Normale Supérieure of Lyon, France
- 2004 – 2007** Classe préparatoire at Lamartinière Monplaisir, Lyon, France

– RESEARCH –

- Technical coordinator for NuBall2 project:

- * NuBall2 is an international project to study nuclear fission at a local accelerator facility. It implies more than 100 physicists (mainly europeans) using a set of detectors (HPGe, LaBr3, BGO) installed around the interaction point
- * I am in charge of the coordination of the tests, installation and running of the experiment
- * With the local team composed of technicians, engineers, phd students, physicists, I make sure that our detectors are up and ready to run when the beam is available

- Project leader for IN2P3 Master Project:

- * PI of the project
- * Leading R&D effort to find new types of wires to be used in drift chambers
- * Coordinating the tests

- R&D for ALERT:

- * I tested a prototype detector in preparation for the ALERT. proposal, working closely with engineers and technicians to design the detector.
- * I compared different types of detectors to choose the most suitable one taking into account the physics constraints. I made the choice to consider a cylindrical hyperbolic drift chamber coupled with scintillators. I have written the simulation code in Geant4 (geometry and reconstruction) in order to determine the expected resolutions, the acceptance, the identification capabilities of the detector.

- R&D for BONuS12:

- * I have developed key simulation tools for gas analysis in the Radial Time Projection Chamber (RTPC) using the Garfield++ program.
- * I was in charge of the electronics test bench for the RTPC as well as the design of the GEM foils.
- * I had a leadership role and was co-supervising four graduate students. Two developed a test bench for the RTPC, one simulated the detector using Geant4 and the last one implemented the code for the RTPC in the CLAS12 framework. For all of them I was providing directions and technical support.

- R&D for HPS:

- * I was in charge of calibrating the electronics of the calorimeter.
- * I was then in charge of mounting and installing the detector at JLab with a team composed of engineers, technicians and students. I also had a master student doing his internship with us. He also performed shielding studies. I took expert and on call shifts for the experiment.

- R&D for CLAS12:

I have participated in the development of Micromegas for the inner tracker of CLAS12. This includes the characterization of resistive and non-resistive curved Micromegas detectors and of the first large resistive detector built by a private company, validation of the electronics developed for the experiment, optimization of the components of the detector to ensure its good operation in the experiment. I also took part in beam test at CERN, then analyze the data to determine the expected spark rates in the Micromegas of CLAS12.

- Simulations for an exotic meson spectroscopy project at CLAS12:

Micromegas developed by CEA Saclay will be necessary for the tracker. It will detect low angles electrons, the other particles being detected by CLAS12. I wrote the reconstruction

algorithm using the Micromegas and a calorimeter. I then analyzed Monte Carlo data of meson production. To perform this work I went twice in Genoa for a total of one month.

-- SOFTWARE EXPERTISE --

C++, Geant4, Java, Gemc (CLAS12 simulation software), Garfield++ (C++ based gas simulation software), Gmsh and Elmer (finite element analysis softwares)

-- PRESENTATIONS AND POSTERS --

- APS April meeting 2017, *Low Momentum Recoil Detector in CLAS12 at Jefferson Lab*, presenter for the BONuS and ALERT collaborations
- Internationale conference on New Directions in Nuclear Deep Inelastic Scattering 2015, *A Low Energy Recoil Tracker (ALERT)*, presenter for the ALERT collaboration
- Internationale conference on Multi Pattern Gaseous Detector 2013, *Progress on CLAS12 Micromegas detectors*, presenter for the CLAS12 collaboration
- Internationale conference Baryons2013, *New detectors for meson spectroscopy in Hall-B at Jefferson Lab*, presenter for the MesonEx collaboration
- Internationale conference Advanced Detectors 2012, *Aging of resistive Micromegas detectors*, poster
- French-Ukrainian workshop on instrumentation developments for HEP, 2015, *ALERT: A Low Energy Recoil Detector*

- Presentations during collaboration meetings of BONuS12, HPS, CLAS, RD51

-- PUBLICATIONS --

- A. Acker et al., *The CLAS12 Forward Tagger*, NIM A, 2020, vol. 959
- G. Charles et al., *Carbon wire chamber at sub-atmospheric pressure*, NIM A, 2017, vol. 855
- G. Charles et al., *Discharge studies in Micromegas detectors in low energy hadron beams*, NIM A, vol. 648, 2011
- I. Balossino et al., *The HPS Electromagnetic Calorimeter* (corresponding author), NIM A, 2017, vol. 854
- M. Battaglieri et al., *The Heavy Photon Search test detector*, NIM A, 2015, vol. 777
- G. Charles, *Micromegas detectors for CLAS12*, NIM A, vol. 718, 2013
- B. Moreno et al., *Discharge rate measurements for Micromegas detectors in the presence of a longitudinal magnetic field*, NIM A, 2011, vol. 654
- G. Charles, *ALERT: A Low Energy Recoil Detector*, *Proceedings of the third French-Ukrainian workshop on instrumentation developments for HEP*, 2015
- S. Procureur et al., *Operation of a resistive Micromegas in Air*, NIM A, vol. 668, 2012
- Co-author of a review note for EIC: T. Horn et al., *Crystal Calorimeter Development for EIC based on PbWO4*
- G. Charles et al. *Status of the BONuS12 Radial Time Projection Chamber*, *Proceedings of Science*, 5th International Conference on Micro-Pattern Gas Detectors, 2017
- High Purity Germanium: From Gamma-Ray Detection to Dark Matter Subterranean Detectors, chapter of the book
- Co-author of several internal notes for HPS:
 - G.Charles and E. Raully, *Current sensitive preamplifier used for HPS calorimeter*, 2016-001 https://misportal.jlab.org/mis/physics/hps_notes/viewFile.cfm/2016-001.pdf?documentId=17
 - G. Charles and E. Rindel, *Instructions on how to move HPS ECal support*, 2015-001

https://misportal.jlab.org/mis/physics/hps_notes/viewFile.cfm/2015-001.pdf?documentId=4

A. Celentano and G. Charles, *Characterization of the ECal crystal light yield and amplification chain*, 2014-002

https://misportal.jlab.org/mis/physics/hps_notes/viewFile.cfm/2014-002.pdf?documentId=2

- Co-author of more than 20 publications with the CLAS collaboration

– PROFESSIONAL SERVICE –

- 2018-now** co-supervision of two graduate students
- 2017** co-supervision of four ODU graduate students
- 2016** Ad-hoc review committee member for CLAS12 collaboration article
- 2014** co-supervision of a PhD at the beginning of her PhD at IPNO
- 2013** supervision of two students during their summer internship at IPNO (university students in their third and fifth year)
- 2013** elected to represent PhDs in the laboratory during my PhD, elected to represent PhDs in the University.

– GRANTS --

- 2020** IN2P3 master project to study new wires for drift chambers (\$30 000)
- 2015** Nuclear Fragments Detector for CLAS12, \$50 000 for equipment from P2IO (consortium of laboratories of the Valley of Saclay).

– MEMBERSHIP --

Member of the American Physics Society (2016) and the following collaborations (the number in brackets indicates the first year of membership):

CLAS (2011), EIC (2015), HPS (2013), BONuS (2016-2018), ALERT (2014), NuBall2 (2019)