

Curriculum Vitae

WORK EXPERIENCE

2017-present

Assistant professor in Experimental Particle Physics, University of Alberta

- Research with the PICO experiment, superheated liquids for DM searches
- Research with DEAP experiment, single phase liquid argon scintillation

Graduate recruitment committee, University of Alberta

Graduate admission committee, University of Alberta

2015-2017

Research Associate in Experimental Particle Physics, Rensselaer Polytechnic Institute – RPI (USA)

- Research with XENON1T dark matter group at RPI
- Analysis of the first XENON1T data:
 - Cut efficiency / signal efficiency / data quality
 - Double/multiple scatters selection
- On-site commissioning work for the XENON1T experiment at the LNGS underground laboratory (Laboratori Nazionali del Gran Sasso) in Italy:
 - Install, operate, and characterize the purification system of XENON1T
 - Implementation of fieldbus control interface (Modbus device RS485) for the pumps of the purification system. Work on slow control group (PAC, SCADA, PLC).

2014-2015

Postdoctoral Fellow in Experimental Solid State Physics, CSNSM Orsay-CNRS (France)

- Research and Development on HPGe detectors:
 - Optimization of the surface treatment for high voltage studies.
 - Complete characterization of the detectors at mK temperatures.

2012-2014

Postdoctoral Fellow in Experimental Particle Physics and in Experimental Solid State Physics, CEA Saclay and CSNSM Orsay-CNRS (France)

- Research with EDELWEISS III collaboration.
- Data analysis for WIMP search at CEA:
 - Optimization of analysis program based on C++, ROOT, Python.
 - Background discrimination studies.
 - Analysis software development.
- Installation of the full setup in LSM (Laboratoire Souterrain de Modane):
 - Mounting of the detectors, verification and installation.
 - Commissioning of new detectors and electronic tests.
 - Participation in the commissioning of the cryostat.
 - Data taking and shift operator on EDELWEISS experiment.
- Systematic Studies on detectors at CSNSM:
 - Complete characterization studies of the HPGe detector at mK temperatures.
 - Understanding of charge transport evolution in operating conditions.
 - Important measurements on charge collection for modeling.
 - Regeneration study for the full efficiency of detectors.
 - Study on surface treatment effect on the detectors and methods.
- Clean room:
 - Mounting of detectors, cabling, soldering to prepare to LSM installation.
- Professional formations:
 - « Utilisation du logiciel ROOT » [19-22 nov.2012, INSTN Saclay]
 - Sécurité E-learning [session du 25mars-19avril 2013]
 - Risques cryogéniques [4 juin 2013, Saclay]

EDUCATION

2008-2012

PhD Candidate in Experimental Particle Physics, University of Montreal (Canada)

- Thesis on Dark Matter Search: “*Nouvelles Limites sur la Détection Directe de la Matière Sombre avec l’Expérience PICASSO*” [New Limits on Dark Matter Direct Detection with PICASSO Experiment]. Submission date May 2012.
- Supervisor: Professor Viktor Zacek.
- Research with PICASSO collaboration.
- Data analysis:
 - Dark matter signal limit setting.
 - Background discrimination studies.
 - Analysis software development.

- Optimization of data acquisition:
 - Studies of raw signals.
 - Installation and electronic tests.
- Detector development:
 - Fabrication of detectors.
 - Complete characterization studies.
- Data taking and calibration, shift operator
- Data taking and calibration, shift operator on PICASSO experiment.
- WHMIS (Workplace Hazardous Materials Information System) training and miner training for underground SNOLAB site at Sudbury in Ontario (Canada).

2006-2008

MSc Degree in Experimental Particle Physics, University of Montreal (Canada)

- Thesis on Dark Matter Search: “*Fabrication et Caractérisation des Détecteurs à Gouttelettes en Surchauffe à Bas Bruit de Fond au Sein du Projet PICASSO*” [Fabrication and Characterization of Low Background Superheated Droplet Detectors with PICASSO project].
- Supervisor: Professor Viktor Zacek.
- Construction and commissioning of new generation of PICASSO detectors.
- R&D activities toward optimization of purification and fabrication procedures.
- Experience with clean room procedures and chemical handling.
- Systematic tests and calibration studies on PICASSO detectors.

2002-2006

BSc. in Physics Department at University of Montreal (Canada)

- Summer student in 2005 on PICASSO experiment.

1995-2002

College/High School: Massabielle, Pointe-à-Pitre, Guadeloupe (France)

- Scientific Baccalaureate Diploma (BAC Sc.).
- Courses in Physics, Chemistry, Maths, Biology and System Technology.
- Options: Latin, final project on consequences of falling asteroids on Earth.

HONORS AND AWARDS

September 2012

Fellowship winner

- Eurotalent fellowship 25K Euros: Two years (2012-2014)

February 2012

Oral Presentation

- First prize at the 49th Winter Nuclear and Particle Physics Conference for Best Oral Presentation (WNPPC 2012).

June 2010

Oral Presentation

- First prize for Best Oral Presentation at the Canadian Association of Physicists (CAP) Congress in Particle Physics Division and Second prize in all Division of Physics.

June 2009

Poster Presentation

- First prize for Best Poster Presentation at the Canadian Association of Physicists (CAP) Congress in Particle Physics Division and Second prize in all Division of Physics.

COMPUTER SKILLS

Operating system: Unix/Linux, Ubuntu, Windows, Mac OSX.

Programming skills:

- Advanced user of MATLAB, LATEX, UNIX shell scripting.
- C++, ROOT, Python.
- Experience with Python MINUIT
- Attended Geant4 Simulation Workshop at McGill University (September 2006).

LANGUAGES

- French (mother tongue)
- English (excellent)
- Italian (excellent)
- Spanish (medium)
- German (beginner)

MEMBERSHIP

11-15 June 2012

- Chair of The Dark Matter II Session at the annual CAP Congress at Calgary.

2008-2012: Canadian Association of Physicists (CAP).

TEACHING EXPERIENCE AND FORMATION

2008-2012

Student Supervision, University of Montreal.

- PhD/MSc students and summer students on PICASSO.
- Training on purification and fabrication procedures.
- Work in clean room.
- Data Analysis: Data taking and calibration tests.

2006-2012

Laboratory Visits

- Undergraduate and college students.
- Visiting lecturers.

Winter 2011

Replacement Teacher, University of Montreal.

- PHY2601: Particle physics.
- Professor Viktor Zacek.

Winter 2009

T.A. (Teacher Assistant), University of Montreal.

- PHY2601: Particle physics.
- Professor Viktor Zacek.

Winter 2008

T.A. (Teacher Assistant), University of Montreal.

- PHY1652: Relativity.
- Professor René Doyon.

Autumn 2007

T.A. (Teacher Assistant), University of Montreal.

- PHY1440: Electricity and Magnetism.
- Professor Paul Taras.

OUTREACH

September 2012

Québec Sciences : Les 50 ans - Code Chastaney interview and film
“Démasker la matière invisible”

May 2012

Seminar Talk for the Association of Women Business Quebec: RFAQ (Réseau de Femmes d'Affaire du Québec) www.rfaq.ca
“La Physique des Particules et la Matière Sombre avec l'Expérience PICASSO”

March 2012

Seminar Talk at the Marianopolis College
“Particle Physics Introduction and Search for Dark Matter with PICASSO Experiment”

3 March 2012

Annual Research Day of Undergraduate Physics students at University of Montreal, presentation of Particle Physics research program
“GPP: Groupe de Physique des Particules de l'Université de Montréal”

March 2011

Annual Research Day of Undergraduate Physics students at University of Montreal, Poster presentation.
“Search for Dark Matter with PICASSO”

2007-2012

Regular Demonstrations to Students: Liquid nitrogen ice cream and meringue.

CONFERENCES, SEMINARS & POSTERS

8 June 2017

Special colloquium, candidate for tenure-track position in astroparticle physics at Laurentian University, Sudbury, Canada

“Towards solving the dark matter puzzle and beyond”

23 May 2017

Special colloquium, candidate for tenure-track position in astroparticle physics at University of Montréal, Montréal, Canada

“Mettre en lumière la matière sombre au-delà des enjeux et des limites actuels”

9 May 2017

Special colloquium, candidate for tenure-track position in astroparticle physics at Carleton University, Ottawa, Canada

“Towards solving the dark matter puzzle and beyond”

4 May 2017

Special colloquium, candidate for tenure-track position in astroparticle physics at University of Alberta, Edmonton, Canada

“Towards solving the dark matter puzzle and beyond”

31 November 2016

Invited seminar at McGill University, Montréal, Canada

“Search for Dark Matter with XENON1T Experiment”

3 November 2016

Invited seminar at physic department of University of Montréal, Canada

“Search for Dark Matter with XENON1T Experiment”

5 July 2016

SUSY 2016 Conference, Melbourne, Australia

“Search for Dark Matter with XENON1T Experiment”

14 January 2015

Karlsruhe Institute of Technology (KIT), Seminar invitation, Germany

“Search for Dark Matter with bubble chamber experiments : PICO”

9 May 2014

Kamioka Observatory - Institute of Cosmic Ray Research (ICRR) - University of Tokyo, Seminar invitation, Japan

“Search for Dark Matter with EDELWEISS”

7 August 2013

University of Montreal, Seminar invitation, Canada

“Search for Dark Matter with EDELWEISS III Experiment”

24-28 June 2013

15th International workshop on Low Temperature Detectors, Pasadena, California

“Trapping length and velocity laws for hot carriers in doped”

“Dopant-related space-charge effects on charge collection in cryogenic Ge detectors for dark matter search”

26 February 2013

**Centre des Sciences Nucléaires et des Sciences de la Matière - CSNSM Seminars,
Invited Speaker at University of Paris-sud, Orsay France**

“Search for Dark Matter with PICASSO Experiment”

11-15 June 2012

CAP Congress 2012, University of Calgary, Canada, Invited Speaker Session

“Status and Results from the PICASSO Dark Matter Search Experiment”

24 May 2012

Montreal Joint High Energy Physics Seminars, University of Montreal, Canada

“Recent Results from the PICASSO Dark Matter Search Experiment”

3 May 2012

Yale University Seminar invitation, CT, USA

“Search for Dark Matter with PICASSO Experiment”

23-26 February 2012

The 49th Winter Nuclear Particle Physics Conference (WNPPC), Québec, Canada

“Recent Results from the PICASSO Dark Matter Search Experiment”

15 April 2011

Invited Seminar Talk at the Albert Einstein Center for Fundamental Physics:

Laboratory for High-Energy Physics (LHEP), Universität Bern, Bern, Switzerland

“Search for Dark Matter with PICASSO Experiment”

7-8 October 2010

ICATPP Conference on Cosmic Rays for Particle and Astroparticle Physics, Italy

“PICASSO: Search for Dark Matter in the Spin Dependent Sector”

7-11 June 2010

CAP Congress 2010, University of Toronto, Canada, Parallel Session Talk, Best Student Oral Presentation Competition

“Background Reduction in PICASSO Detector Modules”

14-20 February 2010

International Conference at Lake Louise Winter Institute 2010, Alberta, Canada

“Status of the PICASSO Experiment for Spin-Dependent Dark Matter Search”

12-14 February 2010

The 47th Winter Nuclear and Particle Physics Conference, Alberta, Canada

“Status of the PICASSO Experiment for Spin-Dependent Dark Matter Search”

18 December 2009

NSERC (The Natural Sciences and Engineering Research Council) Review Committee to obtain fundings, Montreal, Canada

“Analysis of Salt-Less Detectors”

“Detector Fabrication & Purification”

7-10 June 2009

CAP Congress 2009, University of Moncton, Canada, Poster Session , Best Student Poster Competition

“Search for Dark Matter with PICASSO”

8-11 June 2008

CAP Congress 2008, Laval University, Québec, Canada, Parallel Session Talk

“Status of Detector Fabrication”

December 2007

NSERC (The Natural Sciences and Engineering Research Council) Review Committee to obtain fundings, Montreal, Canada

“Low Background Detector Fabrication”

Publication List

Journal Papers: XENON Experiment

XENON Collaboration (E. Aprile et al.)
Signal Yields of keV Electronic Recoils and Their Discrimination from Nuclear Recoils in Liquid Xenon
arXiv:1709.10149 [astro-ph.IM] (28 Sep 2017)

XENON Collaboration (E. Aprile et al.)
Search for Bosonic Super-WIMP Interactions with the XENON100 Experiment
arXiv:1709.02222 [astro-ph.CO] (7 Sep 2017)

XENON Collaboration (E. Aprile et al.)
The XENONIT Dark Matter Experiment
arXiv:1708.07051 [astro-ph.IM] (23 Aug 2017)

XENON Collaboration (E. Aprile et al.)
Intrinsic backgrounds from Rn and Kr in the XENON100 experiment
arXiv:1708.03617 [astro-ph.IM] (11 Aug 2017)

XENON Collaboration (E. Aprile et al.)
First Dark Matter Search Results from the XENONIT Experiment
arXiv:1705.06655 [astro-ph.CO] (18 May 2017)

XENON Collaboration (E. Aprile et al.)
Effective field theory search for high-energy nuclear recoils using the XENON100 dark matter detector
arXiv:1705.02614 [astro-ph.CO] (7 May 2017)

XENON Collaboration (E. Aprile et al.)
Search for WIMP Inelastic Scattering off Xenon Nuclei with XENON100
arXiv:1705.05830 [hep-ex] (1 May 2017)

XENON Collaboration (E. Aprile et al.)
Search for magnetic inelastic dark matter with XENON100
arXiv:1704.05804 [astro-ph.CO] (31 Oct 2017)

XENON Collaboration (E. Aprile et al.)
Online ^{222}Rn removal by cryogenic distillation in the XENON100 experiment.
arXiv:1702.06942 [physics.ins-det] (22 Feb 2017)

XENON Collaboration (E. Aprile et al.)
Search for Electronic Recoil Event Rate Modulation with 4 Years of XENON100 Data
arXiv:1701.00769 [astro-ph.CO] (3 Jan 2017)

XENON Collaboration (E. Aprile et al.)
Removing krypton from xenon by cryogenic distillation to the ppq level
arXiv:1612.04284 [physics.ins-det] (13 Dec 2016)

XENON Collaboration (E. Aprile et al.)
Results from a Calibration of XENON100 Using a Source of Dissolved Radon-220
arXiv:1611.03585 [physics.ins-det] (11 Nov 2016)

XENON Collaboration (E. Aprile et al.)
XENON100 dark matter results from a combination of 477 live days.
arXiv:1609.06154 [astro-ph.CO] (20 Sep 2016)

XENON Collaboration (E. Aprile et al.)
Search for Two-Neutrino Double Electron Capture of ^{124}Xe with XENON100
arXiv:1609.03354 [nucl-ex] (12 Sep 2016)

XENON Collaboration (E. Aprile et al.)
DARWIN: towards the ultimate dark matter detector
arXiv:1606.07001 [astro-ph.IM] (22 Jun 2016)

Journal Papers: EDELWEISS Papers to which my Postdoctoral work contributed directly

M.-C. Piro , A. Broniatowski, S. Marnieros, L. Dumoulin, E. Olivieri
Hot Carrier Trapping in High-Purity and Doped Germanium Crystals at Millikelvin Temperatures.
J. Low Temp. Phys. DOI 10.1007/s10909-014-1088-6 (2014).

A. Broniatowski, M.-C. Piro, S. Marnieros, L. Dumoulin, E. Olivieri
H⁻ -Like Centers and Space-Charge Effects in Cryogenic Germanium Detectors for Dark Matter Search.
J. Low Temp. Phys. DOI 10.1007/s10909-013-1060-x (2014).

S. Marnieros, L. Bergé, A. Broniatowski, A.A Drillien, L. Dumoulin, N. Holtzer, E. Olivieri, M.-C. Piro, O. Rigaut
Controlling the Leakage-Current of Low Temperature Germanium Detectors Using XeF₂ Dry Etching.
J. Low Temp. Phys. DOI 10.1007/s10909-013-0997-0 (2014).

A. Broniatowski, K. Eitel, S. Marnieros, B. Paul, M.-C. Piro, B. Siebenborn, The EDELWEISS Collaboration
Pulse-Shape Analysis of Ionization Signals in Cryogenic Ge Detectors for Dark Matter.
J. Low Temp. Phys. DOI 10.1007/s10909-016-1532-x (2016).

A. Broniatowski, M.-C. Piro, S. Marnieros, L. Bergé, L. Dumoulin, M. Chapellier
Voltage-Assisted Calorimetric Detection of Gamma Interactions in a Prototype Cryogenic Ge Detector of the EDELWEISS Collaboration for Dark Matter Search.
J. Low Temp. Phys. DOI 10.1007/s10909-016-1471-6 (2016).

Other Journal Papers

EDELWEISS Collaboration (E. Armengaud et al.)
Measurement of the cosmogenic activation of germanium detectors in EDELWEISS-III.
arXiv:1607.04560 [astro-ph.CO] (15 Jul 2016)

EDELWEISS Collaboration (L. Hehn et al.)
Improved EDELWEISS-III sensitivity for low-mass WIMPs using a profile likelihood approach.
arXiv:1607.03367 [astro-ph.CO] (12 Jul 2016)

EDELWEISS Collaboration (Q. Arnaud et al.)
Signals induced by charge-trapping in EDELWEISS FID detectors: analytical modeling and applications.
arXiv:1616.08097 [physics.ins-det] (26 Jun 2016)

EDELWEISS Collaboration (E. Armengaud et al.)
Constraints on Low-Mass WIMPs from the EDELWEISS-III dark matter search.
arXiv:1603.05120 [astro-ph.CO] (16 Mar 2016)

EDELWEISS and LUMINEU Collaboration (E. Armengaud et al.)
LUMINEU: a search for neutrinoless double beta decay based on ZnMoO₄ scintillating bolometers.
arXiv:1601.04989 [nucl-ex] (19 Jan 2016)

EDELWEISS and LUMINEU Collaboration (D.V. Poda et al.)
Scintillating bolometers based on ZnMoO₄ and Zn¹⁰⁰MoO₄ crystals to search for $0\nu 2\beta$ decay of ¹⁰⁰Mo (LUMINEU project): first tests at the Modane Underground Laboratory
arXiv:1502.01161 [physics.ins-det] (4 Feb 2015)

EDELWEISS Collaboration (E. Armengaud et al.)
Axion searches with the EDELWEISS-II experiment.
J. of Cosmo. and Astro. Phys. 11(2013)067 doi:10.1088/1475-7516/2013/11/067.

Journal Papers: PICASSO Papers to which my Ph.D. work contributed directly

PICASSO Collaboration (S. Archambault et al.)
Constraints on Low-Mass WIMP Interactions on ^{19}F from PICASSO.
Phys.Lett.B711:153-161 (2012) (*corresponding author : M.-C. Piro).

PICASSO Collaboration (S. Archambault et al.)
New Insights into Particle Detection with Superheated Liquids.
New J. Phys., 13:043006 (2011).

Other Journal Papers

PICASSO Collaboration (S. Archambault et al.)
Dark Matter Spin-Dependent Limits for WIMP Interactions on F-19 by PICASSO.
Phys. Lett. B682: 185–192 (2009).

PICASSO Collaboration (F. Aubin et al.)
Discrimination of Nuclear Recoils from Alpha Particles with Superheated Liquids.
New J. Phys. 10:103017 (2008).

Proceedings

M.-C. Piro et al.
PICASSO: Search for Dark Matter in the Spin-Dependent Sector.
Proc. Of 12th ICATPP Conference on Cosmic Rays for Particle & Astroparticle Physics
October 2010, Como, Italy.

M.-C. Piro et al.
Status of PICASSO Experiment for Spin-Dependent Dark Matter Search.
Proc. Of Lake Louise Institute Conference
29 May 2010, Alberta, Canada.(arXiv: 1005.5455v1).

Award Winners Articles

M.-C. Piro et al.
Background Reduction in PICASSO Detector Modules.
P.I.C.- 2010 (Physics In Canada-2010), Award Winners Article.
<http://www.cap.ca/fr/article/background-reductions-picasso-detector-modules>

M.-C. Piro et al.
Search for Dark Matter.
P.I.C.-2009 (Physics In Canada-2009) (65.3), Award Winners Article.
<http://www.cap.ca/fr/node/515>