

## Marie-Cécile PIRO

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## Research Interests

Particle Physics; Research & Development (R&D) of new technologies; Dark matter (DM); Rare event searches; DM theory; Data Analysis tools development; Cosmic Rays Muon; Low-energy calibration; Directionality channel for future dark matter experiments; Gas purification techniques and assays.

## Dark Matter experiments involvement

- SBC: Scintillating Bubble Chamber (FTE: 0.4)
- NEWS-G: New Experiment With Sphere-Gas (FTE: 0.4)
- PICO: Bubble chamber experiment (FTE: 0.1)
- DEAP 3600: Dark matter Experiment using Argon Pulse-shape discrimination (FTE: 0.1)

## Positions

2017 – present	Assistant professor, Department of Physics, University of Alberta
2015 – 2017	Research Associate, RPI – LNGS, Troy, NY – Gran Sasso, Italy
2014 – 2015	Postdoctoral Fellow, CSNSM – CNRS, Orsay France
2012 – 2014	Postdoctoral Fellow, CEA – CNRS, Saclay – Orsay France

## Education

2008 – 2012	Ph.D. (Exp. particle physics), Université de Montréal (supervisor: Dr. Viktor Zacek)
2006 – 2008	M.Sc. (Exp. particle physics), Université de Montréal (supervisor: Dr. Viktor Zacek)
2002 – 2006	B.Sc. Physics, Université de Montréal

## Honours and Awards (2009 – present)

2012 – 2014	Distinguished postdoctoral fellowship from the European commission: Enhanced EuroTalents Fellow Award: \$20,000
2012	Ph.D. Excellence prize: \$2,000
2012	<u>Best Oral Presentation:</u> First prize at the 49 <sup>th</sup> Winter Nuclear and Particle Physics Conference for Best Oral Presentation (WNPPC 2012): \$250
2010	<u>Best Oral Presentation:</u> 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: \$200
2009	<u>Best Poster Presentation:</u> 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: \$200

## Research Funding

2022	Awarded McDonald Institute (MI) Cross-disciplinary Internship application: 4-month salary: <i>Radon removal by distillation and stripping for rare-event experiments</i> \$12k
2021	Awarded McDonald Institute (MI) Cross-disciplinary Internship application: 4-month salary: <i>Development of teaching tools for high school particle physics projects</i> \$12k
2020	Awarded McDonald Institute (MI) HQP Pool Competition: 2 years' salary for PhD
2019 – 2023	CFI-JELF: “Ultra-low radioactivity gases for new rare event searches and new detector technology” \$200,000 total
2019 – 2023	AB Economic Development and Trade (CFI-JELF): \$200,000 total
2019	Awarded McDonald Institute (MI) HQP Pool Competition: 2 years' salary for Postdoc
2018	Awarded McDonald Institute (MI) HQP Pool Competition: 2 years' salary for Postdoc
2017 – 2023	McDonald Institute grant (MI) for new Faculty: \$40,000/year
2017 – 2023	MI Grant shared between UofA Particle Physics PIs: \$4,923,000 total
2017 – 2023	University of Alberta Start-Up Grant: \$250,000 total

## PUBLICATIONS (2017 – present) Total #: 16 refereed and 2 submitted

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### NEWS-G Collaboration (Total: 7)

L. Balogh, **Y. Deng**, **D. Durnford**, **C. Garrah**, **P. O’Brien**, M.-C. Piro *et al.*, “Measurements of the ionization efficiency of protons in methane”, arXiv.2202.09566 (2022), [DOI: 10.48550/ARXIV.2201.09566](https://doi.org/10.48550/ARXIV.2201.09566) (accepted to Eur. Phys. J. C.)

Q. Arnaud, **Y. Deng**, **D. Durnford**, **C. Garrah**, **P. O’Brien**, M.-C. Piro *et al.*, “Solar Kaluza-Klein axion search with NEWS-G”, Phys. Rev. D 105 (2022), 012002, [DOI:10.1103/PhysRevD.105.012002](https://doi.org/10.1103/PhysRevD.105.012002).

L. Balogh, **Y. Deng**, **D. Durnford**, **C. Garrah**, **P. O’Brien**, M.-C. Piro *et al.*, “Quenching factor measurements of neon nuclei in neon gas”, Phys. Rev. D 105 (2022), 052004, [DOI: 10.1103/PhysRevD.105.052004](https://doi.org/10.1103/PhysRevD.105.052004).

**D. Durnford**, M.-C. Piro, “The search for Light Dark Matter with NEWS-G”, J. Phys.: Conf. Ser. 2156 (2022) 012059, [DOI: 10.1088/1742-6596/2156/1/012059](https://doi.org/10.1088/1742-6596/2156/1/012059).

P. Knight, K. Nikolopoulos, M.-C. Piro, “NEWS-G: Search for Light Dark Matter with a Spherical Proportional”, Proceedings of Science (PoS) ICHEP2020 (2021), 639, [DOI:10.22323/1.390.0639](https://doi.org/10.22323/1.390.0639).

L. Balogh, **Y. Deng**, **D. Durnford**, **P. O’Brien**, M.-C. Piro *et al.*, “Copper electroplating for background suppression in the NEWS-G experiment”, Nucl. Instrum. Methods Phys. Res. A 988 (2021), 164884, [DOI:10.1016/j.nima.2020.16484](https://doi.org/10.1016/j.nima.2020.16484).

Q. Arnaud, **D. Durnford**, M.-C. Piro *et al.*, “Precision laser-based measurements of the single electron response of spherical proportional counters for the NEWS-G light dark matter search experiment”, Phys. Rev. D 99 (2019), 102003, [DOI: 10.1103/PhysRevD.99.102003](https://doi.org/10.1103/PhysRevD.99.102003).

#### SBC Collaboration (Total: 2)

L. J. Flores, **M. Baker**, **D. Durnford**, **Y. Ko**, **S. Pal**, **M.-C. Piro** *et al.*, “Physics reach of a low threshold scintillating argon bubble chamber in coherent elastic neutrino-nucleus scattering reactor experiments”, *Phys. Rev. D* 103 (2021), L091301, [DOI: 0.1103/PhysRevD.103.L091301](https://doi.org/10.1103/PhysRevD.103.L091301).

**D. Durnford**, **M.-C. Piro**, “Nucleation efficiency of nuclear recoils in bubble chambers”, *JINST* 17 (2022) C01030, [DOI: 10.1088/1748-0221/17/01/C01030](https://doi.org/10.1088/1748-0221/17/01/C01030).

#### Cosmic Ray Muons (Total: 2)

A. Fedynitch, **W. Woodley**, **M.-C. Piro**, “On the Accuracy of Underground Muon Intensity Calculations”, *ApJ* 928 (2022), 27, [DOI: 10.3847/1538-4357/ac5027](https://doi.org/10.3847/1538-4357/ac5027).

A. Fedynitch, **W. Woodley**, **M.-C. Piro**, “A Modern High-Precision Calculation of Deep Underground Cosmic Ray Muons”, *Proceedings of Science (PoS) ICRC2021*(2021), 1226 [DOI: 10.22323/1.395.1226](https://doi.org/10.22323/1.395.1226).

#### PhyStat-DM and EXCESS communities (Total: 2)

D. Baxter, **D. Durnford**, **M.-C. Piro** *et al.*, “Recommended conventions for reporting results from direct dark matter searches.” *Eur. Phys. J. C* 81 (2021) 907, [DOI: 10.1140/epjc/s10052-021-09655-y](https://doi.org/10.1140/epjc/s10052-021-09655-y).

P. Adari, **D. Durnford**, **M.-C. Piro** *et al.*, “EXCESS workshop: Descriptions of rising low-energy spectra.” *arXiv* (2022), [DOI: 10.48550/ARXIV.2202.05097](https://doi.org/10.48550/ARXIV.2202.05097). (*Submitted to SciPost Journal*)

#### PICO Collaboration (Total: 5)

B. Ali, **D. Durnford**, **S. Pal**, **M.-C. Piro** *et al.*, “Determining the bubble nucleation efficiency of low-energy nuclear recoils in superheated C3F8 dark matter detectors”, *arXiv*. 2205.05771 (2022), [DOI: 10.48550/ARXIV.2205.05771](https://doi.org/10.48550/ARXIV.2205.05771) (Submitted to *Physical Review D*)

B. Ali, **D. Durnford**, **S. Pal**, **M.-C. Piro** *et al.*, “Results on photon-mediated dark matter-nucleus interactions from the PICO-60 C3F8 bubble chamber”, *arXiv*. 2204.10340 (2022), [DOI: 10.48550/ARXIV.2204.10340](https://doi.org/10.48550/ARXIV.2204.10340) (Submitted to *Physical Review Letters*)

M.G. Aartsen, **M.-C. Piro** *et al.* (IceCube and PICO Collaborations), “Velocity independent constraints on spin-dependent DM-nucleon interactions from IceCube and PICO”, *Eur. Phys. J. C* 80, 819 (2020). [DOI:10.1140/epjc/s10052-020-8069-5](https://doi.org/10.1140/epjc/s10052-020-8069-5).

C. Amole, **S. Pal**, **W. Woodley**, **M.-C. Piro** *et al.*, “Data-Driven Modeling of Electron Recoil Nucleation in PICO C3F8 Bubble Chambers”, *Phys. Rev. D* 100, 082006, (2019), [DOI: 10.1103/PhysRevD.100.082006](https://doi.org/10.1103/PhysRevD.100.082006), 2019.

C. Amole, **M.-C. Piro** *et al.*, “Dark Matter Search Results from the Complete Exposure of the PICO-60 C3F8 Bubble Chamber”, *Phys.Rev.D* 100 (2019) 2, 022001, [DOI: 10.1103/PhysRevD.100.022001](https://doi.org/10.1103/PhysRevD.100.022001).

#### DEAP Collaboration (Total: 6)

P. Adhikari, **C. Bina**, **S. Pal**, **M.-C. Piro** *et al.*, “First Direct Detection Constraints on Planck-Scale Mass Dark Matter with Multiple-Scatter Signatures Using the DEAP-3600 Detector”, *Phys. Rev. Lett.* 128, 011801, (2022), [DOI: 10.1103/PhysRevLett.128.011801](https://doi.org/10.1103/PhysRevLett.128.011801).

P. Adhikari, **C. Bina**, **A. Joy**, **S. Pal**, **M.-C. Piro** *et al.*, “Pulse-shape discrimination against low-energy Ar-39 beta decays in liquid argon with 4.5 tonne-years of DEAP-3600 data”, *Eur. Phys. J. C* 81, 823 (2021), [DOI: 10.1140/epjc/s10052-021-09514-w](https://doi.org/10.1140/epjc/s10052-021-09514-w)

P. Adhikari, C. Bina, A. Joy, S. Pal, M.-C. Piro *et al.*, “Constraints on dark matter-nucleon effective couplings in the presence of kinematically distinct halo substructures using the DEAP-3600 detector”, Phys. Rev. D 102 (2020), 8, 082001, [DOI: 10.1103/PhysRevD.102.082001](https://doi.org/10.1103/PhysRevD.102.082001).

P. Adhikari, C. Bina, A. Joy, S. Pal, M.-C. Piro *et al.*, “The liquid-argon scintillation pulseshape in DEAP-3600”, Eur. Phys. J. C 80 (2020) 4, 303, [DOI: 10.1140/epjc/s10052-020-7789-x](https://doi.org/10.1140/epjc/s10052-020-7789-x)

R. Ajaj, C. Bina, A. Joy, M.-C. Piro *et al.*, “Electromagnetic backgrounds and potassium-42 activity in the DEAP-3600 dark matter detector”, Phys. Rev. D 100, (2019), 7, 072009, [DOI: 10.1103/PhysRevD.100.072009](https://doi.org/10.1103/PhysRevD.100.072009)

R. Ajaj, C. Bina, A. Joy, M.-C. Piro *et al.*, “Search for dark matter with a 231-day exposure of liquid argon using DEAP-3600 at SNOLAB”, Phys.Rev.D 100 (2019) 2, 022004, [DOI: 10.1103/PhysRevD.100.022004](https://doi.org/10.1103/PhysRevD.100.022004)

## PRESENTATIONS (2017 – present)

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### CONFERENCES AND WORKSHOPS (\* indicates an invited presentation)

**Invited: 17; Contributed: 7;**

2022 \*PSI 2022, Paul Scherrer Institute, Villigen, Switzerland. *Plenary Talk to be given in October 2022*

\*TeVPA 2022, Kingston, ON. *Plenary Talk to be given in August 2022*

\*CAP 2022, Hamilton, ON. *Talk*

\*Summer particle Astrophysics Workshop (EIEIOO), Virtual. *Talk*

\*EXCESS 2022 Workshop, Virtual. *Organizing Committee member*

2021 SUSY 2021, Conference, Virtual. *Talk*

\*Summer particle Astrophysics Workshop (EIEIOO), Virtual. *Talk*

CAP 2021, Virtual conference. *Organizer*

\*EXCESS Workshop, Virtual. *Advisory Board member*

\*TIPP 2021, Virtual Conference. *Plenary Talk*

\*Department of Physics, Queen’s University, Virtual Workshop. *Talk*

\*ECFA Noble Liquids, Virtual Symposium. *Expert guidance organizer*

2020 Global Environmental Measurement & Monitoring Initiative (GEMM) Workshop

ICHEP 2020, Virtual conference. *Talk*

CAP 2020, Virtual conference. *Organizer*

\*TRU Virtual Physics Conference, Virtual conference. *Talk*

\*Lake Louise Winter Institute 2020, Chateau Lake Louise, Lake Louise, AB. *Talk*

\*AAPCOS 2020, Saha Institute, Kolkata, India. *Talk*

2019 \*Next Frontier in the search of Dark Matter, GGI, Florence, Italy. *Talk*

\*CAP Congress 2019, Simon Fraser University, Vancouver, BC. *Talk*

2018 CDR (Concept Design Review) for PICO 500 at SNOLAB, Sudbury, ON. *Talk*

\*McDonald Institute launch at Queen’s University, Kingston, ON. *Talk*

EAC meetings (Experimental Advisory Committee), Toronto, ON. *Talk*

\*The 55<sup>th</sup> Winter Nuclear Particle Physics Conference (WNPPC), Mt-Tremblant, QC. *Talk*

## INVITED SEMINARS – INVITED COLLOQUIA

**Total: 13 invitations;**

- 2021 Department of Physics, Duke University, Virtual.  
Department of Physics, Particle Astro group meeting University of Alberta, *Virtual*.
- 2020 CAP tour 2020, University of Regina, Virtual.  
CAP tour 2020, University of Saskatchewan, Virtual.  
SNOLAB Seminar series, Virtual.  
CAP tour 2020, Lethbridge University, AB.  
CAP tour 2020, Brandon University, MB.
- 2019 Department of Physics, University of Alberta, Edmonton, AB.
- 2018 Department of Physics, Harvard University, Boston, MA.
- 2017 Department of Physics, Laurentian University, Sudbury, ON.  
Department of Physics, University of Montreal, Montreal, QC.  
Department of Physics, Carleton University, Ottawa, ON.  
Department of Physics, University of Alberta, Edmonton, AB.

## PRESENTATIONS BY HQP WORKING UNDER MY SUPERVISION

**Talks: 71; Posters: 2; Awards: 6;**

- 2022 D. Durnford, CAP 2022, Hamilton, ON, June. ***Talk***– 1<sup>st</sup> prize winner for the best oral presentation  
C. Garrah, CAP 2022, Hamilton, ON, June. ***Talk***  
X. Li, CAP 2022, Hamilton, ON, June. ***Talk***  
Y. Deng, CAP 2022, Hamilton, ON, June. ***Talk***  
C. Bina, CAP 2022, Hamilton, ON, June. ***Talk***  
X. Li, CAP 2022, Hamilton, ON, June. ***Poster***  
W. Woodley, Neutrino Conference, Virtual, May. ***Poster***  
D. Durnford, APS April Conference, Virtual, April. ***Talk***  
C. Garrah, WNPPC Conference, Virtual, February. ***Talk***  
D. Durnford, WNPPC Conference, Virtual, February. ***Talk***  
W. Woodley, WNPPC Conference, Virtual Conference, February. ***Talk***  
X. Li, WNPPC Conference, Virtual Conference, February. ***Talk***  
Y. Deng, WNPPC Conference, Virtual, February. ***Talk***
- 2021 Y. Deng, Particle Astro group meeting, Virtual, December. ***Talk***  
C. Garrah, Particle Astro group meeting, Virtual, November. ***Talk***  
W. Woodley, Particle Astro group meeting, Virtual, November. ***Talk***  
D. Durnford, Particle Astro group meeting, Virtual, October. ***Talk***  
S. Pal, PANIC Conference, Virtual Conference, September, ***Talk***  
D. Durnford, LIDINE Conference, Virtual, September. ***Talk***  
S. Pal, TAUP Conference, Virtual Conference, August, ***Talk***  
C. Garrah, Particle Astro group meeting, Virtual, July. ***Talk***  
D. Durnford, Particle Astro group meeting, Virtual, July. ***Talk***  
W. Woodley, ICRC 2021, Virtual Conference, June. ***Talk***  
C. Bina, Particle Astro group meeting, Virtual, June. ***Talk***  
W. Woodley, Particle Astro group meeting, Virtual, June. ***Talk***  
C. Garrah, Particle Astro group meeting, Virtual, June. ***Talk***

- C. Garrah, CAP 2021, Virtual Congress, June, *Talk*  
W. Woodley, CAP 2021, Virtual Congress, June, *Talk*– **1<sup>st</sup> prize winner for the best oral presentation**  
F. Wang, CAP 2021, Virtual Congress, June, *Poster*– **3<sup>rd</sup> prize winner for the best poster presentation**  
Y. Deng, CAP 2021, Virtual Congress, June, *Talk*  
I. Doktor, CAP 2021, Virtual Congress, June, *Talk*  
P. O'Brien, CAP 2021, Virtual Congress, June, *Talk*  
D. Durnford, APS April meeting, Virtual Conference, April, *Talk*  
S. Pal, APS April meeting, Virtual Conference, April, *Talk*  
D. Durnford, Particle Astro group meeting, Virtual, March. *Talk*  
C. Bina, Particle Astro group meeting, Virtual, March. *Talk*  
C. Garrah, Particle Astro group meeting, Virtual, March. *Talk*  
P. O'Brien, Particle Astro group meeting, Virtual, February. *Talk*  
Y. Deng, Particle Astro group meeting, Virtual, February. *Talk*  
P. O'Brien, GPSA symposium, Virtual symposium, *Talk*  
F. Wang, CCUWiP 2021, Virtual conference. *Poster*– **1<sup>st</sup> prize winner for the best poster presentation**
- 2020 N. Cruz-Venegas, Particle Astro group meeting, Virtual. *Talk*  
W. Woodley, Particle Astro group meeting, Virtual. *Talk*  
C. Bina, Particle Astro group meeting, Virtual. *Talk*  
D. Durnford, Particle Astro group meeting, Virtual. *Talk*  
S. Pal, Particle Astro group meeting, Virtual. *Talk*  
D. Durnford, Snowmass 2020, Virtual conference. *Talk*  
S. Pal, Summer student orientation, Virtual. *Talk*  
D. Durnford, CAP 2020, Virtual conference. *Talk* – **1<sup>st</sup> prize winner for the best oral presentation**  
S. Pal, CAP 2020, Virtual conference. *Talk*  
A. Joy, CAP 2020, Virtual conference. *Talk*  
D. Durnford, TRU Virtual Conference. *Talk*  
S. Pal, TRU Virtual Conference. *Talk*  
W. Woodley, TRU Virtual Conference. *Talk*  
P. O'Brien, TRU Virtual Conference. *Talk*  
D. Durnford, WNPPC 2020, Banff, AB. *Talk*  
S. Pal, WNPPC 2020, Banff, AB. *Talk*  
W. Woodley, WNPPC 2020, Banff, AB. *Talk*  
P. O'Brien, WNPPC 2020, Banff, AB. *Talk*  
Y. Deng, WNPPC 2020, Banff, AB. *Talk*  
D. Durnford, AAPCOS 2020, Kolkata, India. *Talk*  
P. O'Brien, Particle Astro group meeting, UofA, Edmonton, AB. *Talk*  
Y. Deng, Particle Astro group meeting, UofA, Edmonton, AB. *Talk*
- 2019 S. Hubele, CUPC 2019, Montreal, QC. *Talk*  
D. Durnford, PHYS-STAT, Stockholm, Sweden. *Talk*  
D. Durnford, CAP Congress, SFU, BC. *Talk* – **2<sup>nd</sup> prize winner for the best oral presentation**  
W. Woodley, CAP Congress 2019, Simon Fraser University, Vancouver, BC. *Poster*  
N. Cruz-Venegas, Particle Astro group meeting, UofA, Edmonton, AB. *Talk*  
C. Bina, Particle Astro group meeting, UofA, Edmonton, AB. *Talk*  
W. Woodley, Particle Astro group meeting, UofA, Edmonton, AB. *Talk*  
D. Durnford, Recruitment week-end at UofA, Edmonton, AB. *Talk*  
D. Durnford, International Conference at Lake Louise Winter Institute 2019, AB. *Talk*  
D. Durnford, Particle Astro group meeting, UofA, Edmonton, AB. *Talk*
- 2018 A. Joy, Particle Astro group meeting, UofA, Edmonton, AB. *Talk*  
S. Fielder, Particle Astro group meeting, UofA, Edmonton, AB. *Talk*  
L. Fairgrieve-Park, Particle Astro group meeting, UofA, Edmonton, AB. *Talk*

M. Mueller, Internship Symposium, Telus Centre UofA, Edmonton, AB. *Poster*  
G. Luna Rosseto, Internship Symposium, Telus Centre UofA, Edmonton, AB. *Poster*

## TEACHING ACTIVITIES

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### Department of Physics (University of Alberta)

Fall 2021 PHYS295: Experimental physics I (58 students)  
PHYS130: Wave motion, optics and sound (78 students)  
Winter 2021 PHYS485: Introduction to particle physics (20 students)  
Fall 2020 PHYS295: Experimental physics I (54 students)  
Winter 2020 PHYS485: Introduction to particle physics (15 students)  
Fall 2019 PHYS295: Experimental physics I (42 students)  
Winter 2019 PHYS485: Introduction to particle physics (11 students)  
Winter 2018 PHYS485: Introduction to particle physics (20 students)

## HQP SUPERVISION

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**Current graduate Students** Xiang Li (M.Sc. student, Sept. 2021 – present; expected completion in 2023)  
*Thesis:* Revisiting bubble nucleation theory and nuclear recoil efficiency

Carter Garrah (M.Sc. student, Sept. 2020 – present; expected completion in 2022 – Accepted for Ph.D. at UofA)  
*Thesis:* Simulation fiducialization estimation of the NEWS-G detector and Laser spectroscopy for detecting CH<sub>4</sub> concentration.  
*Awards:*

- NSERC Canada Graduate Scholarship Master program (2021-2022)
- Univ. Alberta M.Sc. Recruitment Scholarship (2020).

Yuqi Deng (M.Sc. student, Sept. 2019 – present; PhD transfer in May 2021; expected completion in 2024)  
*Thesis:* Electron drift simulation of the NEWS-G detector

Daniel Durnford (Ph.D. student, Jan. 2019 – present; expected completion in 2023)  
*Thesis:* Exclusion limits of WIMP interaction for the NEWS-G experiment, Bubble nucleation efficiency for the SBC experiment  
*Awards:*

- NSERC Canada Graduate Scholarship Doctoral program (2020-2023)
- Alberta Graduate Excellence Scholarship (2019)
- Univ. Alberta M.Sc. Recruitment Scholarship (2019).

William Woodley (M.Sc. student, Sept. 2018 – present; PhD transfer in Fall 2020; expected completion in 2023)

**Thesis:** High-precision muon propagator from surface to underground

**Awards:**

- Alberta Graduate Excellence Scholarship (2021)
- Queen Elizabeth II Graduate Scholarship (2018)
- Univ. Alberta M.Sc. Recruitment Scholarship (2018).

## Co-Supervision

Catherine Bina (Ph.D. student, Sept. 2018 – present; co-supervised with A. Hallin; expected completion in 2023)

**Thesis:** Expanding the Region of Interest (ROI) for the DEAP-3600 Experiment

## Thesis completed

Patrick O'Brien (M.Sc. student, Sept. 2019 – September 2021)

Thesis defense: 31st August 2021

**Thesis:** Radon mitigation for the NEWS-G experiment and data processing

**Next Position:** Ph.D student, Earth & Atmospheric Sciences, UofA  
(supervisor: Dr. Arturo Sanchez-Azofeifa)

## B.Sc. Honor's Projects

Julieta Hernandez – PHYS 499 (Winter 2022)

Project: Radon removal with new material: silver zeolite

Yifan Zang – PHYS 499 (Winter 2022)

Project: Camera system for Scintillating Bubble Chamber (SBC) experiment

Xiang Li – PHYS 499 (Winter 2021)

Project: Electric field design and bubble dynamic simulation in the SBC detector

Yuqi Deng – PHYS 499 (Fall 2018)

Project: Fluorescence measurements in Argon and PMT calibration

## Summer Internships

Abrar Islam (May 2022 – Aug. 2022)

Project: Radon removal by distillation and stripping for rare-event experiments

Ian Doktor (May 2021 – Aug. 2021)

Project: Development of teaching tools for high school particle physics projects

## Undergraduate research assistants

Inka Kennepohl (Apr. 2021 – Apr. 2022): **\*USRA during Summer 2021**

Project: Relay lens system testing for the SBC detector

Xiang Li (Apr. 2021 – Sep. 2021)

Project: Bubble nucleation and growth in Argon and Xenon using Molecular dynamics

Freyja Wang (Jan. 2020 – present): **\*SUPRE during Summer 2020**

Project: Bubble nucleation and growth in Argon using Molecular dynamics

Tyler Montgomery (Jan – Dec. 2020)

Project: Super-solid dark matter theory and simulation

Samuel Fielder (May – Aug. 2018 and Sept. 2019 – Dec. 2019)

Project: (1) Testing fluorescence of argon; (2) Henry Law constant experimental setup



Angeline Letourneau (May – Aug. 2019): EDI summer appointment  
 Project: Historical demographic database of gender diversity at University of Alberta

Benjamin Denga (May – Aug. 2019): EDI summer appointment  
 Project: Program initiatives to build and improve a culture of EDI in Sciences

Scott Hubele (Sept. 2018 – Dec. 2019)  
 Project: Distillation and Stripping column to remove radon

Logan Fairgrieve-Park (May – Aug. 2018)  
 Project: Geyser project and distillation of radon

Jamie Dublanko (July – Aug. 2018)  
 Project: Distillation column to mitigate radon

Maximilian Mueller (Jan. – Apr. 2018)  
 Project: Geant4 simulation for gamma background in PICO detector

Giovanna Luna Rosseto (Jan. – Apr. 2018)  
 Project: Geyser project

<b>Research Associates</b>	Scott Fallows (Jan. 2018 – 2020): Research associate <i>Next position:</i> Research Associated in PICO group at UofA
<b>Postdoctoral Fellows</b>	Sumanta Pal (Nov. 2018 – present) Ashley Joy (Aug. 2018 – Jul. 2020) <i>Next position:</i> Postdoc in XENON1T group at Nikhef, Amsterdam, NL Pitam Mitra (Jan. 2018 – Mar. 2018) <i>Next position:</i> Postdoc in DAMIC group at University of Washington, USA
<b>Temporary machinist</b>	Eric Beyer (Jun. 2019 – Mar. 2020)
<b>Engineers - Technicians</b>	Youngtak Ko (Feb. 2019 – present) Mitchel Baker (Aug. 2019 – present) David Biaré (Jan. 2020 – Jan. 2021) <i>Next position:</i> Self-employed

## **GRADUATE STUDENT COMMITTEES**

### **Supervisory committees (University of Alberta)**

#### *Department of Physics*

Xiaoyuan Liu – M.Sc.  
 Ameir Shaa Bin Akber Ali – Ph.D.  
 Fairhurst Lyons – M.Sc. (completed)  
 Michael Staelens – Ph.D. (completed 2021)  
 Clayton Coutu – M.Sc. (completed 2020)  
 Ekaerina Kozmina – Ph.D.  
 Shankar Ganesh – M.Sc. (completed 2019)  
 Anna Morozova – M.Sc. (completed 2019)

### **Ph.D. external examiner**

Hichem Tedjiti, Faculté des Sciences Aix-Marseille Université, Marseille, France (Jan. 2021)

## **M.Sc. external examiner**

Pooja Woosaree, Laurentian University, Ontario, Canada (Dec. 2018)

## **Examination committees (University of Alberta)**

### *Department of Physics*

Michael Staelens (Candidacy exam and Ph.D. defense 2021)  
Jesus Alejandro Marin Calzada – (Ph.D. Candidacy exam 2021)  
Youssef Kora – (Ph.D. Candidacy exam 2021)  
Fairhurst Lyons (M.Sc. defense 2021)  
Clayton Coutu (M.Sc. defense 2020)  
Shankar Ganesh (M.Sc. defense 2019)  
Asma Hattawi (M.Sc. defense 2019)  
Anna Morozova (M.Sc. defense 2019)  
Shankar Ganesh (M.Sc. defense 2019)

## **SERVICE ACTIVITIES**

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### **National Scientific Community**

- Chair of Particle Physics Division (PPD), Canadian Association of Physicists (CAP) 2019-2021
- Research Management Committee (RMC) for McDonald Institute (MI) 2019-2021
- Chair elect of the PICO board 2019
- Vice-Chair of Particle Physics Division (PPD), Canadian Association of Physicists (CAP) 2018
- Vice-Chair elect of the PICO board 2018
- Westcott selection committee 2018

### **Scientific Meeting Organization**

- EXCESS 2022 Workshop, Organizing committee 2022-present
- CAP Congress 2021, Organizing committee (Chair) 2021
- EXCESS Workshop, Advisory Board Member (PhyStat representative) 2020-present
- NEWS-G Collaboration, Annual Meeting Organizer (Chair) 2020
- NEWS-G Collaboration, Workshop Analysis Organizer (Chair) 2020
- CAP Congress 2020, Organizing committee (Chair) 2020
- CAP Congress 2019, Organizing committee (Vice-Chair) 2019
- PICO Collaboration, Annual Meeting Organizer (Chair), Kingston, ON 2019
- DEAP Collaboration, Annual Meeting Organizer (Chair), Edmonton, AB 2018
- Local Organizing Committee (LOC) for the GRaduate Instrumentation Detector School (GRIDS) 2018-2021

### **Scientific Meeting Session Convener**

- CAP Congress 2022, Particle Physics Division (PPD), Hamilton, ON 2022
- EXCESS 2022 Workshop, Virtual 2022
- EXCESS 2021 Workshop, Virtual 2021
- CAP Congress 2021, Particle Physics Division (PPD), Virtual 2021

- NEWS-G Collaboration, Annual Meeting, Virtual 2020
- NEWS-G Collaboration, Workshop Analysis, Virtual 2020
- CAP Congress 2020, Particle Physics division (PPD), Virtual 2020
- PICO Collaboration, Annual Meeting, Kingston, ON 2019
- DEAP Collaboration, Annual Meeting, Edmonton, AB 2018

### **Judge for Student Presentation/Paper Awards**

- CAP Best Oral presentation in Particle Physics and all Divisions 2019-2022
- CAP Best Poster presentation in Particle Physics and all Divisions 2019-2022
- CAP Best Thesis Award in Particle Physics Division 2019
- Canadian Undergraduate Physics Conference (CUPC) Best oral presentation 2018

### **Departmental Committees**

- EDI Committee (Department of Physics) 2020-present
- Outreach/Science Fairs/Open House Committee 2018-present
- Graduate recruitment Committee 2017-present
- Graduate admission Committee 2017-2021

### **Faculty Committees**

- EDI Committee (Faculty of Science) 2020-present

## **OTHER ACTIVITIES**

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### **Membership**

- Institute of Particle Physics (IPP) 2020-present
- Canadian Association of Physicists (CAP) 2017-present
- McDonald Institute (MI) 2017-present

### **Service activities**

- Recruitment weekend, UofA. *Oral presentation*, Virtual. 2022
- Grad Fair, APS April meetings (American Physics society), Virtual. 2021
- Grad Fair, CCUWiP (Canadian Conference for Undergraduate Women in Physics) 2021-present
- Open House lab tours and talks 2019-present
- Grad Fair, CUPC (Canadian Undergraduate Physics Conference), Virtual. 2018-present
- Provided lab tours for high school students and new graduate students at UofA. 2017-present
- Recruitment event, UofA. *Oral presentation & lab tours*, Edmonton, AB. 2018-2020
- November event, UofA. *Oral presentation*, Edmonton, AB. 2017

### **Outreach Talks (\* indicates an invited presentation)**

**Invited: 7; Organizer: 1;**

- \*Bellingham High School, Virtual. *Panel Discussion*, Virtual, Bellingham, WA 2022
- \*Telus Spark Summer Camp for girls, *Oral presentation*, Virtual, Calgary, AB 2021
- \*Jasper Place High School, Virtual. *Oral presentation*, Virtual, Edmonton, AB 2021

- Dark matter day, University of Alberta. *Oral presentation*, Edmonton, AB 2019
- \*S<sup>4</sup> Humans of Physics, UofA. *Oral presentation*, Edmonton, AB 2019
- \*TELUS World of Science. *Oral presentation*, Edmonton, AB 2019
- \*Dark matter day, Queen's University. *Oral presentation*, Kingston, ON 2018
- \*TeamUP Science, UofA. *Oral presentation*, Edmonton AB 2018

#### **Media (\* indicates an invited presentation)**

- YouTube videos for the Open house 2020 at UofA 2020  
[Undergraduate Program](#) – [Physics Demos](#)
- \*Interview Québec Sciences, Code Chastenay on dark matter, Montreal, QC. 2012  
[PICASSO video](#)

#### **Pilot Project**

- Project 1: *Equity, Diversity, Inclusion (EDI): Increasing gender diversity in Physics and inspire visible minorities to enroll in Sciences*, UofA, Edmonton, AB. 2019
- Project 2: *Data collected at different levels at UofA for institutional purposes, such as program evaluation and quality improvement*. UofA, Edmonton, AB. 2019

#### **LANGUAGES**

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