

# Christine Anita Kraus, Ph.D. (she/her)

Curriculum Vitae

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Senior Research Scientist SNOLAB  
Adjunct Laurentian University  
Sudbury, ON  
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705-561-8413

## Education

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|--|-------------|
| <b>B.Sc. (Honours Physics) equivalent,</b><br>Johannes Gutenberg Universität Mainz (Germany)   | <b>1999</b> |
| <b>M.Sc. (Physics) equivalent, Diploma, supervised by Dr. Ernst Otten</b><br>Johannes Gutenberg Universität Mainz (Germany)<br>Simulations on Mainz Neutrino Mass experiment: tachyons, etc. | <b>2000</b> |
| <b>Ph.D. (Physics), supervised by Dr. Christian Weinheimer</b><br>Johannes Gutenberg Universität Mainz (Germany)<br>Final Analysis of the Mainz Neutrino Mass experiment.                    | <b>2004</b> |

## Recognitions

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|--|-------------|
| <b>Breakthrough Prize in Fundamental Physics (co-recipient)</b><br>The Breakthrough Foundation | <b>2016</b> |
| <b>40 under 40 award Sudbury</b>   | <b>2011</b> |
| <b>Inaugural John C. Polanyi Award (co-recipient)</b><br>NSERC, awarded to SNO experiment      | <b>2006</b> |

## Employment History

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|---|-----------------------|
| <b>Senior Research Scientist</b><br>SNOLAB, Adjunct Laurentian University with full supervisory rights and<br>PI for SNO+ grant Laurentian/SNOLAB | <b>2021 - present</b> |
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**Professor** 2010 – 2021  
Canada Research Chair (Tier II) in Particle Astrophysics 2010 to 2019  
promoted to Associate, July 2015

**Research Scientist** 2009  
SNOLAB

**Postdoctoral Fellow** 2004 – 2009  
SNO experiment – later also SNO+, Queen’s University

## **Research**

**SNO+ Collaboration** 2008 – present  
PI for Laurentian/SNOLAB, Site Activity Coordinator, SNO+ Board Chair (2014),  
SNO+ Executive Committee Member  
Calibration Hardware Development, Calibration Deployment and Analysis, Assay  
Program, Background Studies, Cavity and Detector Installations and  
Commissioning, Detector Manager (2009 – 2015)

**SNO Collaboration** 2004 – present  
Calibration Deployment, Background Alpha Counters, Systematics Coordinator  
for Phase Three Results

**HALO Collaboration** - Member 2012 – present

**HALO-1kt Collaboration** - Member 2015 – present

**THEIA Proto-Collaboration** 2016 - present  
Collaboration Member, Speakers Committee

**Mainz Neutrino Mass experiment** 1999 – 2004  
Final Measurement Runs and Final Analysis

## **Scientific Committee Services**

IPP (Institute for Particle Physics) Council 2015 – 2018

SNOLAB Strategic Plan 2023-2029 Advisory Committee	<b>2021</b>
SNOLAB Strategic Plan 2017-2022 Steering Committee	<b>2016</b>
SNOLAB experiment forum (SEF), <i>Co-chair for 2019-2021</i>	<b>2014 – present</b>
McDonald Institute – Faculty Search Review Committee	<b>2016, 2017</b>
CAP Treasurer	<b>2019 – present</b>
CAP Division Chair for PPD	<b>2014 – 2015</b>
CAP Regional Councillor	<b>2011 – 2013</b>
<b>Gutachter Ausschuss BMBF</b> “Universum” Erforschung von Universum und Materie – erUM” (Review for erman unding agency for large projects in Particle Astrophysics and Astrophysics)	<b>2017 – 2020</b> <b>2020 – 2023</b>

### Professional Societies

CAP (Canadian Association of Physicists), PPD and DGEP  
 IPP (Institute for Particle Physics)  
 DPG (Deutsche Physikalische Gesellschaft)

### Research Grants

Canada Research Chair – Tier II: \$100 000 per year	<b>2010 – 2019</b>
CFI for CRC – calibration hardware development ~86k Laurentian portion	<b>2010 – 2014</b>
CFI for CRC – material screening, assays ~91k Laurentian portion	<b>2015 – 2019</b>

SNO+ NSERC grants Laurentian/SNOLAB portion

Year	Amount
2010 – 2011	263,000
2011 – 2012	268,000
2012 – 2013	339,500
2013 – 2014	358,500
2014 – 2015	364,500
2015 – 2016	432,500
2016 – 2017	405,500
2017 – 2018	383,000
2018 – 2019	381,000

*In addition, co-applicant for HALO and HALO-1kt grants, which range from 40k to 90k per year, currently 65k.*

2019 – 2020	383,000
2020 – 2021	385,000

## Teaching

### Graduate student supervision

4 Ph.D. (only available from 2015 onwards)

Name	Time	Title	After
Zachariah Barnard	2015 – 2017	N16 analysis, incomplete	SNOLAB senior operator, industry in Finland
Janet <a href="#">Rumleskie</a>	2016 -	Pre-SN detector, SN simulations	Defending this summer
<a href="#">Pouya Khaghani</a>	2017 -	N16 analysis, Background studies	Writing
Jamie Grove	2020 -	<a href="#">AmBe</a> analysis, <a href="#">Laserball</a>	

10 M.Sc.

Name	Time	Title	After
Zachariah Barnard	2011 – 2013	Low Radon Permeable Gloves and <a href="#">Laserball</a> Simulations for SNO+	Teaching in Toronto
Caitlyn <a href="#">Darrach</a>	2012 – 2016	Supernova Calibration Source	Various jobs, including teaching
<a href="#">Pouya Khaghani</a>	2013 – 2015	Neck Sense Rope Positioning and Leaching Studies	Continued on SNO+ for 1 year
Janet <a href="#">Rumleskie</a>	2013 – 2015	Evaluating SNO+ Background through Rn assays and simulation of alpha/n	Continued as Ph.D. student
Ingrida <a href="#">Semeneć</a>	2015 – 2017	Simulations of <a href="#">AmBe</a> source shielding needs and water analysis	Ph.D. Queen's University
Philip <a href="#">Rost</a>	2015 – 2019	Supernova Burst Analysis	SNOLAB senior operator, mechanical engineering
Pooja <a href="#">Woosaree</a>	2016 – 2018	Assays and Background Studies	Ph.D. <a href="#">UCalgary</a>
Jamie Grove	2019 – 2020	Anti-nu studies	Direct entry to Ph.D.
<a href="#">Adil Hussain</a>	2019 – 2021	Radon assays and Background Studies	Ongoing
<a href="#">Shengzhao Yu</a>	2020 – 2022	Background Studies and Rn assays	Ongoing

## Undergraduate (co-op and summer)

> 50 students

Students highlighted in red are high school students and students high lighted in green received a NSERC USRA.

Year	Winter	Summer	Fall
2010		Justin <u>Viau</u> , Andrew Moss	Justin <u>Viau</u>
2011	Zheng Cui, Connie Storey	Kevin Marshall, Caitlyn <u>Darrach</u> , Melissa <u>Legault</u>	Ian Smith, <u>Rui Xiu Hu</u>
2012	Ian Smith, Kevin Liang, <u>Rui Xiu Hu</u>	Daniel Resnick, Phil <u>Rost</u> , <u>Darryn Cressy</u>	Michael <u>Lecours</u> , <u>Darryn Cressy</u>
2013	Andy <u>Stripay</u> , <u>Randy Perron</u> , <u>Darryn Cressy</u>	Andy <u>Stripay</u> , Sarah <u>Stamplecoski</u> , Phil <u>Rost</u> , Zackery Blair, <u>Darryn Cressy</u> , Matt <u>Depatie</u> , Nick <u>Duhaime</u>	Christopher <u>Pashartis</u> , <u>Raideep Kaur</u> , Nick <u>Duhaime</u>
2014	Christopher <u>Pashartis</u> , <u>Chloe Gagnon</u>	<u>Megan Van Alstine</u> , Jerin Roberts, Phil <u>Rost</u> , <u>Chloe Gagnon</u> , <u>Elsbeth Cudmore</u> , Matt <u>Depatie</u>	Brandon Yee, <u>Jamie Breault</u>
2015	<u>Jamie Breault</u>	Michael Zhu Shantz, <u>Rachel Richardson</u> , Phil <u>Rost</u> , <u>Graham Berardi</u> , Chris Connors, <u>Elsbeth Cudmore</u> , Matt <u>Depatie</u>	Emma <u>Ellingwood</u> , <u>Jasmine Gauthier</u> , <u>Graham Berardi</u>
2016	Emma <u>Ellingwood</u> , <u>Jasmine Gauthier</u>	<u>Josheph Lindon</u> , <u>Rachel Richardson</u> , <u>Graham Berardi</u> , Chris Connors, <u>Melodie Cyr</u>	Joshua Sheridan, <u>Daniel Pracovics</u>

Year	Winter	Summer	Fall
2017	Joshua Sheridan <u>Daniel Pracovics</u>	Stephanie Walton, <u>Daniel Pracovics</u> , <u>Rachel Richardson</u> , Patrick Hatch, <u>Fangwei Chang</u>	<u>Daniel Pracovics</u> , Chris Connors
2018	Chris Connors	Stephanie Walton, Patel Kush, Jamie Grove, Chris Connors, <u>Melodie Cyr</u> , <u>Dominique Delay</u>	<u>Grace Woodliffe</u> , <u>Jedri de Luna</u> , Rhea Gaur, Vincent Albanese
2019	<u>Grace Woodliffe</u> , Evan <u>Vienneau</u> , <u>Jedri de Luna</u> , Rhea Gaur, Vincent Albanese	Evan <u>Vienneau</u> , Stephanie Walton, <u>Jazmyn Zarichney</u> , Connor <u>Felber</u> , Vincent Albanese, <u>Dominique Delay</u>	Connor <u>Felber</u> , Vincent Albanese
2020	Chanel <u>Tanguay</u>	Chanel <u>Tanguay</u> , <u>Sarah Poulin</u> , <u>Huba Khan</u> , Anthony <u>Allega</u> , <u>Caroline Deluce</u>	Chanel <u>Tanguay</u> , <u>Parmesh Ravi</u> , <u>Melodie Cyr</u> , <u>Caroline Deluce</u>
2021	Chanel <u>Tanguay</u> , <u>Parmesh Ravi</u> , <u>Melodie Cyr</u> , <u>Caroline Deluce</u>	Keegan <u>Paleshi</u> , <u>Parmesh Ravi</u> , <u>Victoria Howard</u> , <u>Huba Khan</u> , <u>Caroline Deluce</u> , Anthony <u>Allega</u>	

## 4<sup>th</sup> year thesis supervision

~10

Topics typically related to calibration hardware, covergas or radon.

## Graduate courses

*Graduate level courses in the specific field typically have a small number of students participating at a given year (2-4) and therefore are typically taught as unpaid overloads, often shared between a few teachers. I have taught modules on neutrino mass, neutrino oscillations, cosmology, low background counting, etc.*

Selected Topics in Experimental Physics, Non-Accelerator Particle Physics

## Undergraduate courses

**First Year Physics** (~250 students);

Second year level:

**Electricity and Electronics** (120 student in 2010, then about 25 after)

**Modern Optics** (10-15 students)

**Modern Physics** (~25 students)

**Physics of Hearing and Vision** (~20 students)

**Third Year Lab** (~8 students);

**Fourth Year Directed Studies** (typically 2-4 students) *Topics around SNOLAB physics, astronomy, cosmology, general relativity, etc.*

## Administrative duties – selection

Laurentian University SENATE	<b>2019 – present</b>
Academic Planning Senate sub-committee (ACAPLAN), including Academic Strategic Plan	<b>2017 – present</b>
Research Council, including Research Strategic Plan	<b>2015 – 2019</b>
Graduate Coordinator M.Sc. Physics, Ph.D. Material Science	<b>2019 – present</b>
SEA (Science, Engineering and Architecture) Executive	<b>2019 – present</b>
SEA Faculty Council	<b>2016 – present</b>
Undergraduate Advisor	<b>2018 – present</b>
Women in Physics Rep	<b>2012 – present</b>
Promotion Committee Chair Physics (Outreach)	<b>2010 - 2019</b>

## Events - recent

CAP Conference (VOC member)	2021
CAP U-prize exam coordination	2019 – present
EDI workshop for graduate students	2019 – present
International Conference on Topics in Astroparticle and Underground Physics (TAUP) – chair of LOC	2017
CAP Conference (LOC co-chair)	2014
CAM – Graduate Student Physics Conference, Faculty advisor	2019
TRISEP – Tri-institute Summer School in Elementary Particle Physics	2014, 2017, 2021

## Recent Presentation and Workshops

WIPC (Women in Physics in Canada) 2020 invited speaker – postponed to 2021	
The international Workshop “Massive Neutrinos” invited speaker on “Search for Neutrinoless Double Beta Decay in Liquid Scintillator”	2019
SNOLAB Future Projects Workshop invited speaker “Current Status of SNO+”	2019
International Day of Women and Girls in Science “Neutrinos”	2018
IPP AGM SNO+ update talk	2017
CAP invited talk on SNO+	2016

## Recent Publications

- Albanese, V. et al., The SNO+ Experiment, 2104.11687, arXIV:Physics.ins-det, 2021 – submitted to **JINST**
- Anderson, M. R. et al., SNO+ Collaboration, Development, characterisation, and deployment of the SNO+ liquid scintillator, 2011.12924, arXiv:physics.ins-det, 2020 - **JINST 16** (2021) P05009
- Aharmim, B. et al., SNO Collaboration, Search for hep solar neutrinos and the diffuse supernova neutrino background using all three phases of the Sudbury Neutrino Observatory, **Phys. Rev.D102**, 062006, 2020.
- Anderson, M. R. et al., SNO+ Collaboration, Measurement of neutron-proton capture in the SNO+ water phase, **Phys. Rev.C102**, 014002, 2020.
- Askins, M. et al., THEIA Collaboration, An advanced optical neutrino detector, **EPJC80**, 416, 2020
- Aharmim, B. et al., SNO Collaboration, Cosmogenic Neutron Production at the Sudbury Neutrino Observatory, **Phys. Rev.D100**, 112005, 2019.

- Aharmim, B. et al., SNO Collaboration, Measurement of Neutron Production in Atmospheric Neutrino Interactions at the Sudbury Neutrino Observatory, **Phys. Rev.D99**, 112007, 2019.
- Anderson, M. R. et al., SNO+ Collaboration, Search for invisible modes of nucleon decay in water with the SNO+ detector, **Phys. Rev.D99**, 032008, 2019.
- Anderson, M. R. et al., SNO+ Collaboration, Measurement of the 8B solar neutrino flux in SNO+ with very low backgrounds, **Phys. Rev.D99**, 012012, 2019.
- Aharmim, B. et al., SNO Collaboration, Constraints on Neutrino Lifetime from the Sudbury Neutrino Observatory, **Phys. Rev.D99**, 032013, 2019.
- Aharmim, B. et al., SNO Collaboration, Tests of Lorentz invariance at the Sudbury Neutrino Observatory, **Phys. Rev.D98**, 112013, 2018
- O. Chkvorets, C. Kraus, J. Juettler, V. Lozza, B. von Krosigk, K. Zuber, A tin-loaded liquid scintillator approach for the 2 neutrino double-beta decay measurement of Sn-124, 2017
- Aharmim, B. et al., SNO Collaboration, Search for neutron-antineutron oscillations at the Sudbury Neutrino Observatory, **Phys. Rev.D96**, 092005, 2017.
- B.von Krosigk, M. Chen, S. Hans, A.R. Junghans, T. Kögler, C. Kraus, L. Kuckert, X. Liu, R. Nolte, H.M. O’Keeffe, H.S. Wan Chan Tseung, J.R. Wilson, A. Wright, M. Yeh, K. Zuber, **The European Physical Journal C76**, 3(1-13), 2016
- Andringa, S. et al., SNO+ Collaboration, Current Status and Future Prospects of the SNO+ Experiment, **Advances in High Energy Physics**, Vol. 2016, 6194250
- R. Alves, S. Andringa, S. Bradbury, J. Carvalho, D. Chauhan, K. Clark, I. Coulter, F. Descamps, E. Falk, L. Gurriana, C. Kraus, G. Lefaeuvre, A. Aio, J. Maneir, M. Mottram, S. Peeters, J. RoseL. Seabra, J. Sinclair, P. Skensved, J. Waterfiled, R. White, J.R. Wilson, The Calibration system for the photomultiplier array of the SNO+ experiment, **JINST** Vol. 10, P03002, 2015