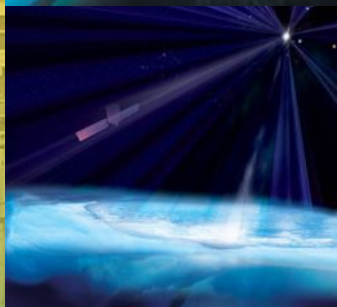


PARTICLE PHYSICS



UALBERTA
PHYSICS

uncovering the mysteries of our universe

The particle physics group at University of Alberta studies the fundamental nature of matter and force. Our work tries to answer some of the most fundamental questions in nature, such as: what is the nature of dark matter? why is the Universe full of matter and not anti-matter? how do neutrinos change flavour and are they their own anti-particle?

Our group plays major roles in large international collaborations around the globe at CERN (Switzerland), SNOLAB (Ontario) and the South Pole.

Nassim Borzogna, Assistant Professor *Dark Matter Physics*

Dr. Borzogna's research is focused on dark matter phenomenology, especially the nature and detection of dark matter, the Galactic dark matter distribution, and dark substructures. The goal of her research is to identify the particle nature of dark matter, through distinct signatures on the Galactic dark matter distribution. Her group uses various approaches to probe the dark matter distribution in the Milky Way, taking advantage of state-of-the-art high resolution cosmological simulations and recent high precision astronomical data.

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Andrzej Czarnecki, Professor

Dr. Czarnecki studies phenomenology of gauge interactions and searches for new physics.

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Doug Gingrich, Professor *ATLAS, quantum gravity*

Dr. Gingrich's research focuses on experimental high energy particle physics using the ATLAS detector at the CERN laboratory in Geneva, as well as phenomenology and searches for quantum gravity and superstring theory.

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Aksel Hallin, Professor
Dark Matter & Neutrino Physics

Dr. Hallin's research focuses on two high priority areas of astroparticle physics: the nature of the neutrino and the search for dark matter. Based on the SNO+ neutrino detector at SNOLAB, the Hallin group studies the measurement of neutrino properties, solar neutrinos and geoneutrinos. As part of the DEAP-3600 experiment at SNOLAB, Dr. Hallin also explores direct detection of galactic dark matter.

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Carsten Krauss, Professor
Dark Matter & Neutrino Physics

Measuring neutrino properties and finding out more about their origin is at the centre of Dr. Krauss' activities with the P-ONE neutrino observatory, currently under construction in the Pacific Ocean. His group has responsibilities for the delivery of the data acquisition and large aspects of the detector construction. His group also leads activities at SNOLAB with the PICO bubble chambers. These very low background detectors are looking for a type of dark matter that interacts via its particle spin. His group is looking for students who are interested in the construction of new and novel instruments and in the analysis of data from cutting edge experiments.

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Alexander Penin, Professor
Perturbative Quantum Field Theory

Dr. Penin studies perturbative quantum field theory and its application to particle and condensed matter physics.

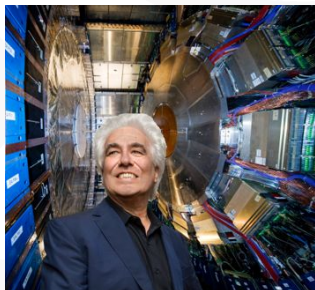
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James Pinfold, Professor
ATLAS, MoEDAL

Dr. Pinfold is working on the ATLAS and MoEDAL experiments at the LHC at CERN. He is involved in the search for magnetic charge, extra dimensions, new symmetries of nature, candidates for dark matter and other avatars of new physics. He is currently involved in the design, construction and testing of a new MoEDAL sub-detector (MAPP) for the detection of fractionally charged particles and new long-lived particles at the LHC. In addition, Pinfold is also contributing to the upgrade of the ATLAS LUCID-luminometer and AFP, ATLAS' latest detector.

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Marie-Cécile Piro, Associate Professor
Dark Matter Physics & Beyond

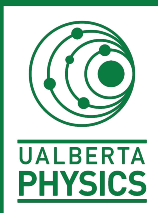
Dr. Piro and her group focus on improving direct dark matter detector technology and performance to add the directionality channel, on micro-physics to understand in-depth the behaviour of the detector, and search for new rare physics processes. Dr. Piro is also exploring new horizons focusing on high-energy cosmic ray muons and dark matter phenomenology.

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Juan Pablo Yáñez, Associate Professor
Neutrino Physics

Dr. Yáñez's main research interest is neutrino physics, in particular neutrino oscillations and the origin of neutrino masses. He is currently involved in the IceCube and P-ONE experiments, as well as in modeling atmospheric neutrino production and the development of novel photodetectors for large particle physics experiments.

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PARTICLE PHYSICS

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