

EXPLORE: Astrophysical Laboratories for Dark Matter Physics

A German-Canadian Collaboration for Undergraduate Research in Theoretical Physics



You and other York students can join in a diverse and international research team together with undergraduate students at Goethe University in Germany. This collaboration is part of a new initiative: *EXPeriential Learning Opportunities through Research and Exchange* (EXPLORE).

Together we will explore one of the most fascinating and yet unsolved mysteries of modern physics: **dark matter**! Dark matter is the mysterious form of matter that makes up most of the matter of the Universe. It exerts an omnipresent gravitational pull on everything -- shaping the entire structure of the cosmos -- but its properties are still largely unknown and it cannot be made from atoms or any other known type of matter.

This research will explore astrophysical systems -- from black holes and neutron stars to galaxies (and beyond) -- as laboratories for testing and measuring dark matter's unknown properties. This project is theoretical in nature and will include both analytical and numerical work aimed at connecting hypothetical dark matter properties to observable signals that may be tested by astronomers. It may also include data analysis or studies of simulations.

This project will be mentored by three faculty members from York University (Profs. Bozorgnia, Rastgoo, Tulin) and two faculty members from Goethe University (Profs. Laura Sagunski and Jürgen Schaffner-Bielich). For more information, please visit <https://astro.uni-frankfurt.de/innovative-teaching/>.



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