Unknown Unknowns

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“What makes up the universe is a very fundamental question,” says third-year honours physics major Miriam Hewlett as she sits in the room in Huggins Hall that will soon become her summer research lab. “From the Standard Model we know a great deal about it, but it’s still an incomplete description. There are so many things we don’t know or don’t completely understand and trying to solve these puzzles is what I find intriguing about theoretical physics.”

Particle physics studies the nature of the very small particles that comprise matter and how they interact. Recent discoveries about these particles and their interactions have raised the profile of the Large Hadron Collider (LHC) buried deep beneath the France-Switzerland border and the High Energy Accelerator Research Organization in Japan which is known as KEK. Theoretical physicists use complex calculations to explain what happens when particles collide or to design new experiments. Miriam’s work is related to an upcoming experiment planned for the SuperKEKB collider at the KEK laboratory.

Miriam’s curiosity and academic ability has been recognized and rewarded by both the Natural Sciences and Engineering Research Council of Canada (NSERC) and Canadian Institute of Nuclear Physics (CINP). She has been awarded a $4,500 NSERC Undergraduate Student Research Award and one of five $3,500 CINP Undergraduate Research Scholarships that will pay for her to work on her fourth-year thesis and help prepare her for the next step in her studies.

“The experiment at SuperKEKB will be performed with lower energy than those at the LHC, which means it will require more theoretical input,” says Miriam. “For my work, it will take me about two months just to learn how to do the calculations. I’m looking at post-graduate programs, either in particle physics research or in medical physics, such as radiation oncology, so this summer will really help me decide what I want to do.”

For Miriam, Acadia was on her list of schools for this very specialized field of study only partly because her mother earned her Chemistry degree at Acadia on her way to becoming a family doctor in Sydney, NS. “I knew a lot about Acadia from my mom, but I also wanted to come to a small school because I knew I’d get personal attention from professors, and this has absolutely been the case. All of my professors have been very supportive, especially Dr. Svetlana Barkanova, who has been a very important mentor and inspiration to me and has really helped open doors. There is so much more research here at the undergraduate level than I ever imagined.

“When I was choosing universities and considering scholarship offers, I was offered more from other schools but the chance to do research tipped the scale. For any student interested in research, I would definitely recommend Acadia because of the research opportunities and the support available from professors.”

“Miriam is brilliant”, says Dr. Barkanova, Miriam’s research supervisor. “She is determined, organized,

and committed. Acadia is the only school in Canada where theoretical subatomic physics research at that level is done by undergraduates because we have very strong and well-prepared students. I keep hearing that students choose Acadia for academic excellence and cutting-edge research opportunities. However, the reason why I joined Acadia's faculty was exceptional Acadia students!"

Working in the lab isn't the only way Miriam spends her time. A volunteer with Acadia's Sensory Motor Instructional Leadership Experience (S.M.I.L.E.) since her first year, Miriam says she has looked forward to every week she has spent in a "great" program. She is also now volunteering with Acadia's chapter of Women in Science and Engineering (WISE) where she speaks directly to young women who are considering their university options about her Acadia experience and the rewards of scientific research. Miriam has also received funding from the NSERC (Natural Sciences and Engineering Research Council of Canada) Chair for Women in Science and Engineering Atlantic to visit high schools to give talks on subatomic physics and inform students of the research possibilities available to them.

"We know that women are strongly under-represented in Physics, Computer Science and Engineering", says Dr. Barkanova, "and we know that having role models like Miriam may encourage girls to consider careers in science and technology. She is brilliant, but she also very down-to-earth and easy to relate to. Not only is Miriam a promising young researcher, but I think she might make a huge positive difference for many young women inspired by her example."

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