University of Regina

DEPARTMENT OF PHYSICS

ACADEMIC UNIT REVIEW SELF STUDY REPORT

2015 – 2025

1. Background

Our department offers programs leading to B.Sc. and B.Sc. Honours degrees in physics, applied and industrial physics, and M.Sc. and Ph.D. degrees in experimental and theoretical subatomic physics. There is one adjunct faculty member (Lawler) at Campion College whose research is in astronomy, and students working with her may obtain a MSc degree in physics. The department owns the astronomy observation domes, a teaching laboratory, and additional equipment on the top floor of the classroom building. The astronomy classes and labs have been taught by Campion since 2007. We offer labs for PHY 109 and 119 for First Nations University of Canada.

We deliver ~50 teaching laboratory sections per year, primarily for service classes. Two full-time lab instructors (Szymanski, Katsaganis) teach the labs, design and maintain experiments, and coordinate all laboratory operations. They have recently initiated a unique online laboratory partnership with Kwantlen Polytechnic University in BC where equipment at either location can be remotely operated by students at either university. This online laboratory partnership is one of the first of its kind in Canada and we are hoping to expand this further in the coming years.

In research, it became clear in the early 1980's that the department would not be large enough to sustain a cutting edge and competitive research program in a more than a couple of research areas. The decision was made back then to concentrate our resources in the field of subatomic physics with experimental and theoretical components. Over the past decade, the largest research contributions of the department are experimental studies related to hadron physics (Huber, Papandreou), neutrinos (Barbi, Kolev), and rare isotopes (Grinyer). We have since expanded our research programs in applied nuclear physics (Berg, Teymurazyan) and subatomic theory (Ouimet, Vujanovic).

Our department has won numerous awards related to teaching and research. In 2024, our members were awarded a President's Award for Service Excellence at the University of Regina in EDI (Grinyer) and Outstanding Graduate Supervision (Huber). Dr. Grinyer was also named a Fellow of the Canadian Association of Physicists (2024) and a "Woman of Distinction" from YWCA Regina (2025). Graduate students in our department have been awarded competitive grants from NSERC through the Canada Graduate Research Scholarships (CGS) program and the Canadian Institute of Nuclear Physics (CINP) Graduate Fellowship program. In 2023, Karthik Suresh was awarded the JSA/Jefferson Lab PhD thesis award for analysis of the neutral b_1 meson at GlueX. In 2024, Alicia Postuma received a prestigious Vanier Scholarship for her PhD research project to study hadron structure at JLab.

We are the smallest physics department in Canada (nine NSERC eligible faculty members) offering a full graduate degree program (MSc and PhD). Our external research grants and contracts, that total more than $11M over the last 10 years (2015 to 2025), and the funding received per faculty member are among the highest at the University of Regina. A summary of the total (and estimated) number of NSERC eligible faculty, research funding, and current graduate student enrollments can be found in Figures 1 and 2 of the Appendix. Our impact and the opportunity that our research programs offer for training the next generation of physicists can be measured by the total number of published refereed articles and proceedings (321 since 2015) and citations (8382). Curricula vitae of our all of our faculty members are also provided as an appendix.

2. Staffing and Resources

2.1. Staffing - faculty, instructors, lab instructors, technicians, and support staff

Name	Position and Rank	Notes
Barbi, Mauricio	Professor	Science Appeals Committee
Berg, Marcella	Assistant Professor	Co-op Coordinator
Grinyer, Gwen	Professor	UofR EDI Advisory Committee
Huber, Garth	Professor	Curriculum Committee Chair
Katsaganis, Stamatios	Laboratory Instructor	
Kolev, Nikolay	Assistant Professor	Graduate Coordinator
Lawler, Samantha	Associate Professor	Campion College, Associate Member
Mobed, Nader	Professor	Retired (December 31, 2025)
Nielsen, Joelle	Administrative Assistant	
Ouimet, Pierre	Assistant Professor	Honours Research Coordinator
Papandreou, Zisis	Professor	Dept. Head, Undergrad Advisor
Sardarli, Arzu	Professor	First Nations U, Associate Member
Szymanski, Shaun	Laboratory Instructor	
Teymurazyan, Aram	Associate Professor	Seminar Coordinator
Vujanovic, Gojko	Assistant Professor	CRC Tier-2
Lolos, George	Emeritus Professor	
Mathie, Ted	Emeritus Professor	
Papini, Giorgio	Emeritus Professor	

* In addition to those members listed here, we have grown from 3 to 12 adjunct faculty members (since 2015). The "people page" on our website has more information: https://www.uregina.ca/science/physics/directory/index.html

2.2. Resources

2.2.1. Teaching Space

Room	Capacity	Function
LB 125	24 (Equipped lab space)	Lab for Physics 111/112/377
LB 126	24 (Equipped lab space)	Lab for Physics 109
LB 129	12 (Equipped lab space)	Lab for Physics 372/471
LB 131	3 (Equipped computer lab)	Undergraduate Study Lounge
LB 132	24 (Equipped lab space)	Lab for Physics 119/201
LB 134	Support for undergrad labs	Equipment Storage
LB 136	24 (Equipped lab space)	Lab for Physics 261/242/392
LB 228	8 (Audio-visual equipment)	Distance Education
CL 508/510	24 (Equipped lab space)	Lab for Astronomy 101/201/202

2.2.2. Research Space

Room	Function	Principal Investigators	Funding agency
LB 114, 119	Graduate Student Offices	Huber/Papandreou	NSERC Halls C&D/JLab
LB 116	Nuclear Imaging	Teymurazyan/Papandreou	Fedoruk/Prairies Can
LB 116.1	Graduate Student Office	Huber/Papandreou	NSERC EIC
LB 117	T2K and Hyper K	Barbi/Kolev	NSERC Neutrinos
LB 123	Graduate Student Offices	Barbi/Berg/Grinyer/Kolev	NSERC Multiple
LB 123.1	Neutron Imaging Lab	Berg	NSERC/Startup
LB 123.3	Rare Isotope Science Lab	Grinyer	NSERC/CFI JELF
LB 127	GlueX/EIC Detector Lab	Papandreou	NSERC/DOE/Fedoruk/CFI IF
LB 205, 215	Postdoc Offices	Multiple	NSERC Multiple
LB 208	Remote Counting House	Huber/Papandreou	NSERC Halls C&D/JLab
LB 263	Graduate Student Office	Vujanovic	NSERC
AH 106	Advanced Computer Lab	Vujanovic	NSERC/CRC-CFI

2.2.3. Specialized teaching equipment and instrumentation

Equipment/Instrumentation	Location	Notes
Electronics Lab Course	LB 125	Electronics kits, oscilloscopes, Digital voltmeters, electrical components (amplifiers)
Senior Lab Courses	LB 129	Compton, Cavendish, Speed of Light, A/C Circuits, Kater Pendulum, DAQ Digitizer, Muon Lifetime
Computer Lab	LB 131	For undergraduate students
Demonstrations	LB 134	Pulse Jet Bicycle, Kelvin's Thunderstorm, Ruben's Flame Tube, Scuba Tank Skateboard
2nd Year Laboratories	LB 136	Hot-Air Engine, Wind Tunnel, Specialized Camera
Telescopes	CL 508	Two 10” domes, portable: twelve old 5”/ three modern 8”

2.2.4. Research equipment and instrumentation

Equipment/Instrumentation	Location	Funding agency	Notes
Measurement Instrumentation	LB 116,118,127	NSERC/TRIUMF JLab/DOE/Fedoruk	Picoammeters, power supplies, oscilloscopes, microscopes, photodiodes, spectrophotometer
PCs and laptops for Data Acquisition and Electronics	LB 116,118,127	NSERC/TRIUMF JLab/DOE	NIM + CAMAC electronics, CAEN digitizers, DAQ software (CAEN, MIDAS laptop running SensL
3D Printers	LB 123,127	NSERC/TRIUMF/JLab	Formlabs 3D (resin) printer, 2 Anycubic 3D (filament)
Individual SiPMs, PMTs, and photodiodes	LB 116,118,127	Fedoruk/DOE/NSERC	1x1mm^2, 3x3mm^2, PMTs, photodiodes, 16-pad SiPM arrays, 9x16 super arrays
Am-Be Neutron Generator	LB 130	UofR	

2.2.5. Research institutes, clusters, or specialized labs

LB 116-Detector Development Lab (Nuclear Imaging): The nuclear imaging group (Teymurazyan, Papandreou), funded by the Fedoruk Centre and in partnership with Jefferson Lab, constructed a Positron Emission Tomography scanner for plant-root imaging, complemented by a multi-head positron detector for above soil measurements. Subsequent funding from Western Economic Development led to the construction of one of the world's largest and novel scanners (BioPET, $1M). Also, during this period, an X-Y scintillating-fiber photon beam profiler ($56k) was built and deployed at Hall D/Jefferson Lab with Hall D funding.

LB 118-Neutrino Lab (HyperK/T2K): This is an advanced R&D facility for detector components for the T2K and Hyper-K neutrino experiments, both located in Japan ($2.5M in funding to UofR). Our lab's extensive project history includes developing detector systems for WCTE at CERN and EMPHATIC at Fermilab, alongside current R&D for various Hyper-K projects beyond LED mPMT systems and supernova studies. The lab also features high-power computing resources for in-house micro-CT rendering and chemical analyses that support a highly successful paleontology project that has yielded significant discoveries and garnered substantial media attention.

LB 123.3-Rare Isotope Science Lab (Regina Cube): The Regina Cube for Multiple Particles (RCMP) is a high-efficiency array of double-sided silicon-strip detectors that provides world-leading sensitivity to measurements of charged-particle emission from the decays of rare isotopes. The cube was funded via the CFI-JELF program (Grinyer, $131k, 2020) and was designed for the GRIFFIN spectrometer at TRIUMF. Design, construction, and tests of the array were performed in-house at the UofR. It was then shipped to TRIUMF in summer 2023 for a first experiment with GRIFFIN in 2024. The RCMP lab is currently working on improving the design and testing electronics for future experiments.

LB 127-Detector Development Lab (GlueX/EIC): This group (Papandreou, Teymurazyan) has assumed responsibility for the R&D, design and construction of the 98 End-of-Sector Boxes (ESB, $2M) for the ePIC/EIC Barrel Imaging Calorimeter (BIC). Each ESB will contain acrylic light guides, 60 large-SiPMs, end-of-tray cards that will be developed by NASA/GSFC to readout silicon tracker trays and read out by next generation ASIC boards (CALOROC), cooled by chilled-water and flushed by dry nitrogen. This lab also carried out the scintillating fiber vendor evaluation (US $7M) for BIC.

AH 106-High-Performance Computing Lab: The High-Energy Nuclear Theory group (Vujanovic) has recently acquired high-performance computing hardware that consists of computing nodes with various architectures from AMD and Intel, a 100G network switch, and a ZFS storage. This hardware was purchased through CFI-JELF program (Vujanovic, $176k, 2024) and is currently being tested. The 100G switch enables additional hardware to be added to this configuration in the future.

LB 113-Machine Shop (no longer operational): The University's only CFI-Innovation Fund (IF) award in the 2023 competition was to build the SoLID Heavy Gas Cherenkov vessel for JLab (Huber, $200k, 2023-2025). The success of this award was only made possible because of earlier prototyping work that relied on the machine shop. The machine shop was also used extensively for the GlueX/BCAL, HyperK, RCMP, and Hall C Cherenkov detector projects. The loss of this space will significantly impact our ability lead large-scale detector development projects in the future.

3. Scholarly Output

3.1.1. Summary

Our research in subatomic physics is carried out along the 5 major themes. Over the 10-year period, from 2015 to 2025, our researchers published 321 refereed journal articles, proceedings, and review articles that have been cited 8382 times. With nine research faculty members, this corresponds to an average of ~3.6 refereed publications per faculty per year. Over this same period, we have awarded 18 MSc and 8 PhD degrees in the research areas described below.

Hadron Physics (Jefferson Lab and EIC)
JLab is considered the "*premier*" nuclear research facility in the world. Department members (Huber, Papandreou) have been involved with JLab since 1990, during the early physics definition studies, and before construction began. During this period, the UofR was the only Canadian university represented at JLab and this proved critical in terms of the reputation and the trust that the lab's management and the US Department of Energy placed in the UofR group. In the last decade, Teymurazyan has supported experiments in Halls C and D. Since 2020, All three faculty are active in the EIC, working on physics event generators (Huber) and leading the R&D on the End-of-Sector Boxes for the Barrel Imaging calorimeter (Papandreou, Teymurazyan).

Rare Isotopes (TRIUMF)
The Department has long been associated with research at TRIUMF, Canada's Particle and Accelerator Centre. By 1983-84, there were two faculty members (Lolos, Mathie) with research programs based at TRIUMF and, in 1989, the UofR became the first university in Canada to be an Associate Member of the lab. Today, we are one of 21 University Members of TRIUMF and have an active research program in rare-isotope science at ISAC and the future ARIEL facility (Grinyer).

Neutrinos (HyperK)
Neutrino physics has been a core research program in the Department for two decades. In 2016, our group received a share of the Breakthrough Prize in Fundamental Physics for research into neutrino oscillations as part of the T2K collaboration. Faculty members (Barbi, Kolev) are now working towards next generation neutrino experiments.

Applied Physics (Fedoruk Centre, Canadian Light Source)
With the recent hires of Fedoruk Research Chairs in Nuclear Imaging Technologies (Teymurazyan) and Neutron Imaging (Berg), our research in applied physics has grown considerably over the last decade. The Department is also a world leader in studying preserved blood vessels and soft tissue structures in a 66-million-year-old Tyrannosaurus rex fossil (Barbi) using synchrotron radiation imaging at CLS.

Subatomic Theory
The subatomic theory group is an essential component of our department both in terms of teaching and in providing crucial support to many of our experimental research faculty and their graduate students. The theory group consists of a Canada Research Chair in subatomic physics phenomenology (Vujanovic) and an active member of the JETSCAPE Collaboration, and a faculty member working within the MoEDAL experimental collaboration at CERN (Ouimet). Our third theorist (Mobed) retired at the end of 2025.

3.1.2. Statistical summary of published and accepted scholarly work over the last ten years

	Number	Notes
Refereed journal articles	267	
Refereed conference proceedings	48	
Refereed review articles	6	
Technical reports	96	
Book chapters and other editorial material	9	
Total number of citations	8382	
Other scholarly output (specify):		
Average refereed articles	3.6	per faculty, per year
Average h-index	12.2	9 faculty, range: 3 to 24

3.1.3. Grants and Contracts

Principal Investigator(s)	Funding Agency	Total Amount (% Assigned To Unit)	Dates
Huber, Garth	NSERC, SAPIN	$75,000	Apr 2015-Mar 2016
Huber, Garth	NSERC, Subgrant	$40,000	Apr 2015
Huber, Garth	CINP, Executive Director	$255,000	Jul 2015-Jun 2025
Papandreou, Zisis	NSERC, SAPPJ	$405,000	Apr 2015-Mar 2018
Tacik, Roman	NSERC, SAPPJ	$266,824	Apr 2015-Mar 2017
Papandreou, Zisis & Teymurazyan, Aram	GIFS	$4,500	May 2015-Aug 2015
Huber, Garth	NSERC, SAPIN	$552,600	Apr 2016-Mar 2021
Papandreou, Zisis	NSERC, SAPPJ	$411,000	Apr 2016-Mar 2019
Teymurazyan, Aram	NSERC, Discovery	$171,840	Apr 2016-Mar 2023
Huber, Garth	NSERC, Subgrant	$32,000	Apr 2016
Huber, Garth	Sylvia Fedoruk Centre	$62,252	Apr 2016
Papandreou, Zisis & Kaletsch, K. (Industry par.)	NSERC IRAP	$10,000	May 2016-Aug 2016
Barbi, Mauricio	NSERC, SAPPJ	$225,168	Apr 2017-Mar 2020
Huber, Garth	NSERC, Subgrant	$38,000	Apr 2017
Huber, Garth	CFI	$44,930	Apr 2017
Papandreou, Zisis & Teymurazyan, Aram	CFREF	$184,500	Apr 2017-Mar 2020
Grinyer, Gwen	NSERC, SAPIN	$811,040	Apr 2018-Mar 2025
Barbi, Mauricio	NSERC, Subgrant	$18,400	Apr 2018
Huber, Garth	NSERC, Subgrant	$28,000	Apr 2018
Huber, Garth	Mitacs	$6,000	Apr 2018
Papandreou, Zisis	Sylvia Fedoruk Centre	$6,750	Apr 2018-Mar 2019

Papandreou, Zisis & Teymurazyan, Aram	Sylvia Fedoruk Centre	$164,800	Apr 2018
Teymurazyan, Aram	Mitacs	$30,000	Apr 2018
Teymurazyan, Aram & Papandreou, Zisis	Western Economic Development	$348,431	Apr 2018-Mar 2020
Papandreou, Zisis	NSERC, SAPPJ	$433,000	Apr 2019-Mar 2022
Barbi, Mauricio	NSERC, Subgrant	$18,400	Apr 2019
Huber, Garth	NSERC, Subgrant	$2,000	Apr 2019
Teymurazyan, Aram	NSERC, Subgrant	$25,000	Apr 2019
Grinyer, Gwen	CFI & Innovation SK	$94,734	Apr 2019
Papandreou, Zisis	Mitacs	$12,000	May 2019-May 2020
Teymurazyan, Aram	Mitacs	$40,000	Apr 2019
Barbi, Mauricio	NSERC, SAPPJ	$524,835	Apr 2020-Mar 2023
Lawler, Samantha	NSERC, Discovery	$171,840	Apr 2020-Mar 2025
Lawler, Samantha	NSERC, Supplement	$12,500	Apr 2020
Huber, Garth	NSERC, SAPIN	$550,000	Apr 2021-Mar 2026
Huber, Garth & Papandreou, Zisis	NSERC, Subgrant (EIC)	$29,577	Apr 2021-Mar 2023
Teymurazyan, Aram	NSERC, Subgrant	$29,000	Apr 2021
Barbi, Mauricio	CFREF Subgrant	$22,908	Apr 2021
Barbi, Mauricio	Innovation SK	$30,000	Apr 2021
Papandreou, Zisis	NSERC, SAPPJ	$495,000	Apr 2022-Mar 2025
Huber, Garth	NSERC, Subgrant	$57,091	Apr 2022
Teymurazyan, Aram	NSERC, Subgrant	$25,000	Apr 2022
Barbi, Mauricio	CFREF Subgrant	$28,102	Apr 2022
Barbi, Mauricio	Innovation SK	$85,000	Apr 2022
Berg, Marcella	Fedoruk Chair Research Grant	$250,000	July 2022
Huber, Garth	CFI	$10,000	Apr 2022
Papandreou, Zisis & Teymurazyan, Aram	Jefferson Laboratory	$56,090	Oct 2022-Sept 2023
Vujanovic, Gojko	NSERC, SAPIN	$250,000	Apr 2023-Mar 2028
Grinyer, Gwen	NSERC, SAPPJ	$150,000	Apr 2023-Apr 2026
Huber, Garth & Papandreou, Zisis	NSERC, Subgrant (EIC)	$30,000	Apr 2023-Mar 2025
Barbi, Mauricio	NSERC, SAPPJ	$642,547	Apr 2023-Mar 2026
Barbi, Mauricio	CFI	$104,291	Apr 2023
Barbi, Mauricio	Mitacs	$3,000	Apr 2023
Barbi, Mauricio	Innovation SK	$42,500	Apr 2023
Grinyer, Gwen	CFI IOF	$20,000	Apr 2023
Huber, Garth	Innovation SK	$100,000	Apr 2023
Huber, Garth	StonyBrook	$68,924	Apr 2023-Mar 2026
Vujanovic, Gojko	CRC Annual Research Stipend	$100,000	Apr 2023-Mar 2028

Berg, Marcella	NSERC, DG	$125,000	Apr 2024-Mar 2029
Berg, Marcella	NSERC, Supplement	$12,500	Apr 2024
Huber, Garth & Papandreou Zisis & Teymurazyan, Aram	NSERC, Subgrant (EIC)	$25,000	Apr 2025-Mar 2027
Barbi, Mauricio	CFI	$42,500	Apr 2024
Berg, Marcella	Fedoruk 2024 Grant	$94,955	Apr 2024
Huber, Garth	Innovation SK	$100,000	Apr 2024
Papandreou, Zisis	Brookhaven Science Associates	$363,825	Apr 2024
Teymurazyan, Aram & Papandreou, Zisis	Jefferson Science Associates	$114,000	Apr 2024-Mar 2026
Vujanovic, Gojko	CFI-JELF & Innovation SK	$176,209	Apr 2024
Huber, Garth	NSERC, Subgrant	$56,622	Apr 2025
Grinyer, Gwen	NSERC, SAPIN	$570,000	Apr 2025-Mar 2030
Huber, Garth	CFI IF & Innovation SK &UofR CFI match	$1,019,000	May 2025-Nov 2030
Papandreou, Zisis	NSERC SAPPJ	$489,000	Apr 2025-Mar 2028
Total (w/o Fedoruk Chair)		**$11,883,986**	**2015-2030**
Fedoruk Chair Funding			
Papandreou, Zisis	Fedoruk Chair (Teymurazyan Aram)	$1,475,144	Jul 2014-Jun 2019
Papandreou, Zisis	Fedoruk Chair (Berg, Marcella)	$1,000,000	Jul 2022-Jun 2027
Total (w/ Fedoruk)		**$14,359,130**	**2015 - 2027**

4. Community Service Initiatives

Southeastern Universities Research Association (SURA)
SURA is a consortium of 60 universities based out of Washington, DC, and operates Jefferson Lab for the U.S. Department of Energy through Jefferson Science Associates. Based on the excellent record established by the UofR team at Jefferson Lab, SURA invited the UofR to be the first international full member of SURA and this was officially accomplished in 2010. Since then, SURA funds have supported sabbatical leaves at Jefferson Lab and student stays at the lab for a total of ~US$40k. Papandreou is the UofR's Trustee on behalf of the UofR President.

Canadian Institute of Nuclear Physics (CINP)
As one of its founding institutional members, the department has played a major role in CINP over the last two decades. Huber was the founding President, served as a member of the Board, and, since 2013, has been its Executive Director. Papandreou served on the Board (2008-2010). Grinyer has also served on the Board (since 2018) and is the current President of CINP (since 2021).

Participation in learned and professional societies
We are members of the Canadian Association of Physicists Division of Nuclear Physics (DNP) and the Canadian Institute of Particle Physicists (IPP). Since June 2025, Vujanovic has been an Associate Editor of the Canadian Journal of Physics.

Conference Organization
The department hosted the Canadian Conference for Undergraduate Women (CCUWiP) in 2023 that was chaired by undergrad student Madelyn Kaban and was attended by 51 students from across the country. We also hosted 2SLGBTQ+ in STEM Canada 2024, chaired by grad student Alicia Postuma, and welcomed 59 delegates, as well as Theory Canada 2025, that welcomed 35 delegates.

National and Regional Science Fairs
Our department has been heavily involved with the Canada Wide Science Fair (CWSF) and the Regina Regional Science Fair (RRSF) for many years. Ouimet joined the RRSF organizing committee in 2009, and has taken on several leadership roles, most recently as Chief Judge of the CWSF in 2023.

High-School and Community Outreach
Physics lacks diversity and systemic barriers are known to prevent diverse students from achieving their full potential. To address these inequities, our department has taken on a leadership role in organizing events that focus on engaging high-school students from underrepresented backgrounds. We have hosted 34 visits (over the last 10 years) from high school students and girl guides groups. Since 2021, we have hosted "STEM for ALL", an annual night of science demos for students from the 2SLGBTQ+ community. We also organize campus wide (public) seminars on 2SLGBTQ+ in STEM Day and the International Day for Women and Girls in Science. The department organized a solar eclipse viewing on April 8, 2024, that was attended by 1000 people and hosted a Chancellor's Community fund raising event in Astronomy on March 18, 2025. Papandreou has organized the Bushwakker Pub Talks (7 talks/year) since 2017 that aims to bring timely scientific discussion to the local community. We also operate our own department website, which underwent a major upgrade in 2023, and we run social media accounts on Facebook, Instagram, and YouTube.

5. Programs Offered

5.1. Programs

The Department offers majors and minors programs leading to B.Sc. and B.Sc. Honours in Physics and a B.Sc. in Applied Physics. Co-operative Education programs with local industry play an important role in our undergraduate programs. Our graduate programs lead to M.Sc. and Ph.D. in Physics.

Undergraduate Programs
All applicants admissible to the Faculty of Science may choose Physics as their major or minor. The Department offers two streams of first year courses, a calculus-based and an algebra-based stream. Students have the option of entering the program through either stream. The undergraduate degree in physics is a 4-year program consisting of 120 credit hours. The contents and scope of the program are standard in that the emphasis is placed on understanding core physics subjects in the following areas: mechanics, optics, electricity and magnetism, modern physics, thermal and statistical physics, and quantum mechanics. The program is enriched by both required and elective classes in health physics, nuclear physics, particle physics, fluid mechanics, condensed matter, mathematical physics, and general relativity. Our undergraduate programs are designed to allow the option of obtaining a minor in other academic areas. Popular minors for physics students are mathematics and computer science. The Department also offers minors. All students have access to the Science Academic Hub for program design and advising, and the Department Head (Papandreou) advises undergraduates.

Graduate Programs
The primary focus of research in the Department is Subatomic Physics. The graduate course offerings thus include Quantum Mechanics, Electricity and Magnetism, General Relativity, Quantum Field Theory, Thermal Field Theory, Subatomic and Intermediate Energy Physics, and a host of special topic courses appropriate for specific research programs. Occasionally, distance education methods have been used to access some required courses. Student research is conducted at local, regional, national, and international facilities as detailed in the research section of this document. Grad student support (co-supervision and committee membership) is enriched by the 11 adjunct faculty members in the department.

Coop and Experiential Learning
Students have an opportunity to enhance their skills and to potentially identify a career path through our Co-Op program. The Department has averaged about 4.5 students per semester enrolled in the Co-op program over the past 10 years. The goal of this program is to the opportunity to dedicate part of their undergraduate experience towards internship at different institutions from commercial to science-based, such as the Allan Blair Cancer Center and AREVA Resources Canada. Additionally, our undergraduate students can work with faculty members, usually on summer research projects. Often the research requires travel to national and international locations to access world-class facilities.

Physics Mentorship Program
In the last 5 years, we have initiated a one-on-one undergraduate/faculty mentorship program. This gives undergraduates the opportunity to meet with faculty and discuss career and program planning. Faculty mentors and students change every semester.

5.2. Service teaching in support of other programs

The Department teaches service classes primarily for programs in the Faculty of Science and Faculty of Engineering and Applied Science. The BSc programs in Biology, Chemistry, Biochemistry, and Earth Sciences each require six credit hours of first year physics. In addition, several pre-professional programs in science including pre-med, pre-dentistry, pre-veterinary, and pre-optometry, require three to six credit hours of first year physics. All the BASc programs in the Faculty of Engineering require six credit hours of first-year physics. Electronic System Engineering Program requires an additional second year physics course in Electricity and Magnetism. All these courses have a laboratory component. The Secondary BEd program in Physics includes six physics courses. Other programs in Science, Arts, Fine Arts, Education, Kinesiology & Health Studies, and Business Administration list physics as an option for their lab-based Science electives. The 1st and 2nd-year physics labs are supervised and taught by two lab instructors, and ~20 graduate student teaching assistants. The instructors have an excellent set of complementary strengths, and the teaching assistants have always shown a serious commitment to the undergraduate labs. The first- and second-year labs consist of 54 robust experiments which are flexible across different courses. A new program that allows students to access their laboratory equipment remotely, either at the University of Regina or at Kwantlen Polytechnic University in BC has shown initial success and there are plans to expand this in the future. The lab program is currently heavier in the Fall semester, which presents a logistical challenge given the fixed number of lab slots during regular business hours.

5.3. Enrollment trends

Service enrollments: The total enrollment in first year physics courses has decreased from ~1000 to ~700 between the years 2015 to 2025. The largest decrease is due to Engineering enrollment (one example being the recent restructuring of the Petroleum Engineering program). In 2015-2017, the department taught ~600 engineering students annually, which was ~60% of our service classes. These numbers have dropped to ~200 and 22%, respectively. A smaller decrease can be correlated to campus-wide enrollments.

Physics majors: The total number of undergraduate students majoring in physics has been steady, subject to small fluctuations, resulting in a 10-year average of 42 students/yr in all undergraduate physics programs. The average number of convocating physics majors is 4.6 per year while another 4.1 students per year graduate with minors. In addition, the department is engaged in high-school student recruitment with the goal to increase physics graduands by 50% in the next four years.

Graduate student enrollments: The Department currently has 18 graduate students. This number has doubled since 2015, owing to the 4 new faculty hires since then (see Figure 2 in the Appendix). Over the past 10 years, the number of graduate students has varied from 11 in 2015, to 15 in 2019, to 22 in 2022 and to the current 18, resulting in a 10-year average of 17 graduate students per year.

On average (since 2015) our total student makeup consists of ~17% international, ~54% domestic at the undergraduate level, and ~10% international, ~19% domestic at the graduate level (total 100%).

5.4. Successes

Physics teaches independent thinking and skills that are transferable to several other professions including data science, financial analysis, medical physics, border security, nuclear energy, research and development, and teaching. Many of our students have received NSERC undergraduate summer research awards or MSc/PhD Canadian Graduate Research Scholarships. A measure of our success is the current occupations and employability of our former graduates.

Occupations of former students
Photon Science Staff at Brookhaven National Lab, Science Associate at the Canadian Light Source, Instructor at Saskatchewan Polytechnic, Teachers in K-12, Instructor at EYES (UofR), Grid Computer Specialist at UofT, Postdoctoral Fellow at the University of Heidelberg on LHCb, Implementation Engineer at Power Information Technology Services, Software Developer iQMetrix, Radiation Safety Officer at the Cross Cancer Institute in Edmonton, Radiation Physicist at the Allan Blair Cancer Clinic, Medical Physicist at the Saskatchewan Cancer Agency, Medical Physicist at the Royal Victoria Hospital, Health Physicist at Cameco, Research Associate at Carleton University, Data Scientists at Farm Credit Canada, Saskatchewan Government Insurance, and ASI Engineering, among others.

Testimonials from former students
“I am grateful for my experience in the UofR undergrad physics program. The small and close nature of my classes allowed me to connect with my classmates and professors. I had the opportunity to participate in summer research, which enhanced my understanding of many of the topics covered in my coursework. I spent two summers receiving training at the GlueX experiment at Jefferson Lab. Not only did I fall in love with physics at the UofR, but I fell in love with research. I was surrounded by people who were driven by curiosity, and who dedicated their lives to exploring the unknown. I am now finishing a master’s in medical physics at UBCO and will be attending medical school at the UofS next year. These opportunities were made possible from support of the UofR physics department, and the high-quality teaching and mentorship that laid a strong foundation for my academic path.” - *Madelyn Kaban, B.Sc. Honours (Great Distinction, 2024), MSc candidate UBC Okanagan.*

"I was inspired to join physics by a professor who visited my high school, and it was one of the best decisions I made. The small class sizes meant I worked closely with classmates and profs, forming a tight comradery with the other students. Although classes were difficult, the professors set us up to succeed and were open to every question; they pushed us to expand our limits and handled the COVID pandemic with compassion and care. I feel that taking my undergrad degree at the UofR enabled me to obtain work experience I might not have had the chance to otherwise. It has greatly improved my critical thinking and problem-solving skills, as well as my self-confidence in what I can achieve, and resulted in close friendships without which I would not have succeeded nearly to the same degree.'' - *Breanna Crompvoets, B.Sc. Honours (High Honours, 2021), Ph.D. candidate UVic.*

“My time as an undergrad at the Physics department provided a foundation for my understanding in many fields such as physics theory, mathematics, and programming; more broadly helping me develop my studying and researching skills. There is a lot more opportunity to get involved with the department, between the Physics Student Society and Physics Build Club. I went on to pursue the field of quantitative finance. I appreciate the professors and department for making the experience such a rich learning experience.” - *Sunny Dhaliwal, B.Sc. Physics and Economics*

6. UNIT BUDGET

The Physics Department budget is based on the yearly request submitted by the department to the Faculty of Science. The department budget for the fiscal years 2015-2025 is presented below.

Fiscal Year	Salaries (TAs)	Capital + Non-capital	Total
2015	65,766	12,000	77,766
2016	66,817	12,000	78,817
2017	67,584	12,000	79,584
2018	67,669	12,000	79,669
2019	66,080	12,000	78,080
2020	66,707	12,000	78,707
2021	68,361	12,000	80,361
2022	69,057	12,000	81,057
2023	70,035	12,000	82,035
2024	54,998	12,000	66,998
2025	56,952	12,000	68,952

The largest portion of the budget provides financial support for physics graduate student teaching assistant (TA) positions to support the undergraduate laboratory program. The TA budget of the Department is augmented by additional Graduate Teaching Assistantships (GTA), provided by the Faculty of Graduate Studies and Research through a Faculty of Science allocation based on full-time thesis students. Over the years, requests submitted by the Department to the Faculty of Science for major lab upgrades and equipment have been favourably considered, subject to availability of funds.

Graduate students are supported by grants, departmental TAs, Graduate Studies GTAs, Base Funding (GSBF), and Thesis-Only (TOS) funding. The average departmental allocations in the last four years have been $20,300 (GSBF), $22,300 (TOS) and 6 (GTAs). These are distributed fairly to students that have above 80% GPA. In 2025, a university-wide Graduate Minimum Funding program commenced ($15,500/yr, $8,000 from FGSR and $7,500 from supervisor). A total of 15 GMFs were allocated to the Faculty of Science and from those 2 were allocated to Physics.

In addition, over the last five years we have made a concerted effort to offer our large service classes later in the evening, which generates revenue for the Faculty of Science through the funding model of the Centre for Continuing Education (CCE). These funds support Faculty of Science discretionary operations (startup funds, research opportunity ‘seeds’, and more).

In summary, the Department operates effectively within its budget allotment and has assisted the Faculty of Science with revenue generation.

7. SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats)

Strengths

Research performance is the Department's main strength. Our grants and publications present a research intensity and leadership that are exceptional for a small department. One should note that ours is the smallest physics department in the country that offers a full graduate degree program (MSc and PhD). All faculty members are NSERC grant holders on an uninterrupted timeline, and our external research grants and contracts per faculty member are among the highest at the University of Regina. Furthermore, most of our faculty have played leading roles in their respective experimental programs. The recognition of excellence includes NSERC, other domestic sources of research funding, and international funds.

In addition to their research projects, graduate students and postdoctoral researchers are exposed to highly competitive and scientifically advanced international arena at laboratories in Canada, Europe, the U.S. and Japan. The Department has also placed undergraduates on work terms at laboratories in the U.S. and Europe and has had students from abroad pursue research projects on-campus with our faculty. In terms of internationalization, our department ranks among the top at the UofR.

To develop research excellence and impact in a small department, we have had to be selective in the pursued research directions. A critical mass of graduate course offerings can only be maintained if the Department's efforts are narrowly concentrated. Our focus has thus been in subatomic physics, but our graduate students receive graduate courses to build their knowledge on fundamentals such as electromagnetism and quantum scattering theory, in addition to nuclear and particle physics. In recent years, the Department has added applied subatomic physics to its portfolio with students and postdocs already finding success in this area.

Our undergraduate program has significant strengths. We serve two main groups, students in the Physics major stream and those in "service" classes for other degree programs, primarily in Science and Engineering. Our service classes have declined in numbers, as described in Section 4. Our Physics major enrollment is stable, and the quality of instruction is very high as evidenced by student testimonials and teaching evaluations received from students at all levels. The UofR currently ranks 6th in Maclean's in terms of student-to-instructor ratios, and the Department of Physics offers this advantage to our students.

A small and research focused department also allows us to collaborate across disciplines and to build a more inclusive teaching and training environment. Students, postdoctoral fellows, and faculty all work together to create a space where everyone's perspectives are welcome. A lot of this work has resulted from our commitment to Equity, Diversity and Inclusion, a core value of the strategic plan of the University of Regina (2020 to 2025).

Weaknesses

The Department's main weaknesses are imposed by external factors, and, as such, the Department has limited means to mitigate their effects.

One weakness is the low Physics major enrollment compared to other Science programs. Physics is perceived as being challenging, and physics teachers in local high schools generally do not have a physics degree. Systemic barriers faced by marginalized students further reduce students' interest in STEM fields. Our attempts to nurture these students have been met with limited success, and many of them change their field of study and are lost to physics. Those who remain, however, enjoy and benefit greatly from their physics studies and enjoy much success. Low student enrollments in Physics Departments all over N. America are common. Given our teaching reputation and research success, the university (President, VPR and Dean) has been very supportive of the department.

A weakness, which restricts the enrollment in our Applied Physics B.Sc. program, is that it is not P.Eng. accredited (and cannot be due to Provincial rules). However, we received the co-operation of the Faculty of Engineering when this program was first set up.

There are challenges in 1st year service courses connected to assignment assessment (academic honesty) and engagement. The former is not tracked carefully owing to the large number of students (a resource issue). Various methods are being employed to engage students during the lectures with some success, such as PHET/oPhysics simulators and having the students work on class.

Opportunities

The partnership with the Fedoruk Centre has been fruitful. The mandate of this provincially funded institute is to place Saskatchewan among the global leaders in nuclear research, development and training. Our department's detector expertise and future participation in nuclear safety and science communication are a natural fit into the *Nuclear Imaging Technologies* and *Material Sciences with Neutrons* part of the institute's mandate. We have been the recipients of two bridge-funded faculty positions in those areas (Teymurazyan and Berg).

The Department is in an excellent position to capitalize on its research record and take advantage of present and future research projects. This is clear in the pursuit of future bridged-funded faculty positions with Jefferson Lab (currently being negotiated) and with SaskPower or the Fedoruk Centre (hoped for, related to the province's nuclear file). A major new opportunity may be connected to the Electron-Ion Collider, where our hadronic physicists are leading a CFI-IF effort on the barrel imaging calorimeter for the ePIC detector. Such projects offer experiential opportunities for students.

Threats

With the recent retirement in theory, the department is finding it difficult to offer graduate and senior undergraduate courses in theoretical and mathematical physics. To meet the student course requirements, we had to assign sessional lecturers to PHYS 201 (E&M) and 202 (classical mechanics), which has never happened before in the history of the Department. Creative efforts are underway to fill the vacancy as submitted to the Dean of Science in a formal report on positions.

Further reduction in research-active faculty positions will erode the MSc and PhD programs, as we will not be able to deliver the required graduate courses in a timely manner for every student. This, in turn, would have substantive impact on our research and external funding, would be a detriment to a cost-effective operation of the lab program and, consequently, negatively impact our ability to offer service classes to the Faculties of Science and Engineering. Figure 1 in the Appendix shows the impact, under this scenario, to our research capacity and funding if upcoming retirements (Mobed, Huber, Papandreou) are not replaced. This is a major threat over the next 5 years.