Applying for NSERC PGS D

Physics first year seminar
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NSERC PGS D

NSERC Postgraduate Scholarships – Doctoral program

Overview	
Value	PGS D: $21,000 per year for three years.
Application deadline (through a Canadian institution)	Contact your institution.
Application deadline (directly to NSERC)	October 17

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NSERC Postgraduate Scholarships – Doctoral program

Overview	
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Should you care?

- Only if you're **Canadian:**
  - citizen / permanent resident / refugee
  - ≤ 3rd year if no master's, ≤ 2nd year otherwise
- You can apply **every year** you are eligible
- Need previous degree from Canadian institution
- CGS D vs. PGS D

Reasons to apply

- Same reason as any other fellowship!
  - main reason: **$$$$$$$$$$**
  - looks nice on a CV, too
- Specific to NSERC PGS:
  - you're probably not eligible for much else
  - high (40-50%) **success rate**; cf. NSF GRFP ~15%
- **You should apply**

Application components

- Apply **online**:
  - Personal info, academic background, etc.
  - 2 letters of recommendation
  - Diversity considerations in research
  - Outline of proposed research (2 pages)
  - Contributions and statements (2 pages):
    - list of research contributions
    - description of most significant contributions
    - applicant statement: a) research experience, b) relevant activities

Selection criteria

- 50% **research ability and potential**:
  - research proposal
  - academic and research experience, contributions
  - and several more…
- 50% **relevant experiences**:
  - academic record, past awards/scholarships
  - professional activities, outreach, etc.

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Letters

- One should be from current advisor
- Second from one “familiar with your research… abilities”
- Probably good to have a letter from a Canadian

Diversity considerations

- **Required** component, even if irrelevant to your research

DIVERSITY CONSIDERATIONS IN RESEARCH DESIGN

Are diversity considerations including, but not limited to, sex and gender taken into account in the research design, methods, analysis and interpretation, and/or dissemination of findings?

☐ Yes ☒ No

NOTE

If you answer "yes" to the question above, please ensure that diversity considerations are incorporated throughout your proposal (i.e. research design, methods, analysis and interpretation, and/or dissemination of their findings).

If you answer "no" to the question above, please use the text box provided to explain why diversity considerations are not relevant to your research design.

As my proposed research focuses on the physics of elementary particles, diversity considerations are not relevant to my research design, methods, analysis, nor interpretation.

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Disclaimer: I am not perfect!

This is how I did:

Selection Criteria	Average Merit Score	Ranking
Research ability and potential (50% weighting)	5.00	25
Relevant experience and achievements obtained within and beyond academia (50% weighting)	4.73	34
Overall (out of 6)	4.87	**26 out of 169 applications in Selection Committee 178**

but I'll show you my proposal anyway

Research proposal

- **Clarity of communication** is essential: don’t use jargon; audience is a physicist, but not in your subfield
- Specific and focused research questions and methodology
- Significance of your research to the scientific community

Excerpt #1

The Standard Model (SM) of particle physics represents an enormous triumph for the scientific community in its successful description of all the fundamental forces but gravity. With the discovery of the Higgs boson eight years ago, all of the elementary particles in the SM have now been discovered. Subsequent experiments have, so far, confirmed properties of the Higgs boson consistent with the predictions of the SM. Despite its success, there remain several theoretical and experimental puzzles that strongly suggest the SM is not the final story. Motivated by this, high-energy physicists endeavour to construct models of new physics beyond the SM, as well as to further develop our understanding of the SM and of quantum field theory in general. Building on recent work, I propose a research project to advance both of these pursuits, broadly centered around the study of dilatons, a hypothetical type of particle.

Research proposal

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Excerpt #2

As the first goal of my research project, I intend to investigate the rich phenomenology of our model. There are numerous opportunities to search for our dilaton in experiments, many of which will be collecting data within the next five years. These include LHC-beauty (LHCb) and the Forward Search Experiment (FASER) at the LHC as well as the Fermilab SeaQuest experiment [4–6]. Using analytical and numerical tools, I will study experimental predictions of our model, with an emphasis on the potential for probing the dilaton at the aforementioned experiments. Furthermore, I will develop potential ultraviolet (UV) completions of the model, which may lead to new experimental signatures as well. For instance, UV completions will likely include supersymmetric partners of the electroweak gauge bosons, potentially observable at the High-Luminosity LHC, which is scheduled to begin operations in 2027.

Research proposal

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Excerpt #3

The dilaton is a scalar particle, the Goldstone boson of spontaneously broken scale invariance, which arises in numerous contexts in high-energy physics. Beyond the SM, dilatons arise in Randall-Sundrum (RS) models [1]—a well-established approach to the hierarchy problem, a major theoretical difficulty of the SM concerning the mass of the Higgs boson which is discussed in more detail below. Models in which the Higgs boson is composite, rather than elementary, can solve the hierarchy problem as well. Such models contain a dilaton, as they are related to RS models via the anti-de Sitter / conformal field theory (AdS/CFT) correspondence. Dilatons also play an important role in some approaches to the cosmological constant problem, the task of explaining the extremely small size of the cosmological constant observed in our Universe [2]. Additionally, dilatons generally appear in string theory, where the dilaton field controls the string coupling.

Recently, my collaborators and I have proposed a new paradigm for solving the hierarchy problem in which the dilaton plays a fundamental role [3]. The hierarchy problem concerns the

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Contributions and statements

- List of contributions; description of two most significant ones; summary of past research
- **Relevant activities**:
  - teaching, mentoring, etc.
  - collaboration with others
  - science promotion
  - community outreach
  - department organizations (e.g. grad society)
  - and many more options!

Some final notes

- Results are released in **April**
- Clickable links for when these slides are posted:
  - PGS D webpage
  - CGS D webpage
  - PGS D instructions
  - 2020 competition statistics
- **You should apply!**