Applied Category Theory Adjoint School – application

1. Contact information

Name: Tomas Gonda
Email: tgonda@perimeterinstitute.ca
Office phone number: +1 519 569-7600 8025
Institution: Perimeter Institute for Theoretical Physics
Address: 31 Caroline Street North, Waterloo, ON, Canada
Postal code: N2L 2Y5

2. Educational history

2017-present – PhD at Perimeter Institute for Theoretical Physics
Supervisor: Robert Spekkens

2016-2017 – Perimeter Scholars International at Perimeter Institute for Theoretical Physics
Obtained degree: MSc Physics from University of Waterloo

2013-2016 – University of Edinburgh
Obtained degree: BSc Matematics and Physics, First Class
Average grade: 92%

2006-2013 – Gymnazium Grosslingova, Bratislava
High school with focus on mathematics.

3. Details of PhD

I expect to complete my PhD in 2021. The subject matter is concerned with the study of the abstract framework of resource theories and its various applications.

4. Other information

I can commit to coming to Oxford even in case there is no funding available.

5. Why am I interested in ACT 2019?

In Edinburgh I started an undergraduate degree in Theoretical Physics, but I soon realized that I enjoy the courses in abstract algebra the most. To accommodate for that I changed the degree to a joint one of Mathematics and Physics. In the end I didn't learn much about category theory there, despite several interactions with Tom Leinster.

Only when I came to Perimeter Institute I was exposed to it from various directions. Most notably, my Master's research project was concerned with the relevance of resource theories to causal inference. In spite of working with few concrete instances of categorical concepts, I am still yet to become well versed with much of the basic notions in category theory and their relations.

One reason, why I would like to take part in the school is to give me short term motivation to learn more about category theory. I think that learning by doing is the best way to learn. Additionally I hope to be able to use category theoretic thinking in both my current and future research. Most concretely, I think it would help clarify a large part of the conceptual basis for my current projects pertaining to

resource theories. Moreover, in the future I would like to apply category theory in the study of causality and other topics in fundamental physics.

However, the main reason for my interest in category theory is not to find a specific application in a certain field. Rather, I consider it to be of great importance for organizing and translating knowledge. I believe that the multidisciplinary nature of the school and the workshop would help stimulate such endeavours.

6. Relevant background

I have very little explicit background directly related to category theory. I am familiar with its ideas and several basic concepts. In my day to day research, I often resort to literature on category theory when I need to clear up some inconsistencies and confusions, but I haven't (yet) built a strong foundation of knowledge in this area of mathematics.

7. Order of project preference

1. Partial evaluations, the bar construction, and second-order stochastic dominance
2. Toward a mathematical foundation for autopoiesis
3. Traversal optics and profunctors
4. Complexity classes, computation, and Turing categories
5. Simplifying quantum circuits using the ZX-calculus
6. Formal and experimental methods to reason about dialogue and discourse using categorical models of vector spaces