

Ph.D. Candidate

**Yavar Abdolmaleki**

Graduate Academic Unit

**Math & Statistics**

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**January 20, 2022**

**2:00 p.m.**

**Virtual Defence**  
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**Examining Board:**

Dr. Nicholas Touikan (Mathematics & Statistics)

Dr. Brent Petersen (Electrical and Computer Engineering)

Dr. Rod Cooper (Computer Science, retired)

Dr. Dan Kucerovsky, (Mathematics & Statistics) Supervisor

**External Examiner:** Dr. Igor Nikolaev

Assistant Professor

Math and Computer Science

St. John's University

**The Oral Examination will be chaired by:**

Dr. Kevin Englehart, Acting Dean of Graduate Studies

**BIOGRAPHY**

**Universities attended (with dates & degrees obtained):**

2014 – present Ph.D. candidate, University of New Brunswick

2012 Master of Pure Mathematics, Shahid Beheshti

2008 Bachelor of Pure Mathematics, Razi University

**Presentations:**

**Abdolmaleki, Y.** Morse Theory, University of New Brunswick, December 11, 2014.

**Abdolmaleki, Y.** Clifford algebras, University of New Brunswick, December 1, 2015.

**Abdolmaleki, Y.** The Theory of Transformation Groups and the Structure of Manifolds, University of New Brunswick, March 23, 2017.

**Grants and Awards:**

Mathematics & Statistics Graduate Scholarship, University of New Brunswick 2017.

NBIF STEM Scholarship, New Brunswick Innovation Foundation, Canada. 2015.

UNB Graduate Bursary, University of New Brunswick, Fredericton, Canada. 2018.

Full Scholarship for Iranian national universities 2004-2009.

Full Scholarship for Iranian national universities 2009-2012.

**Participation in conferences, workshops, Advanced schools:**

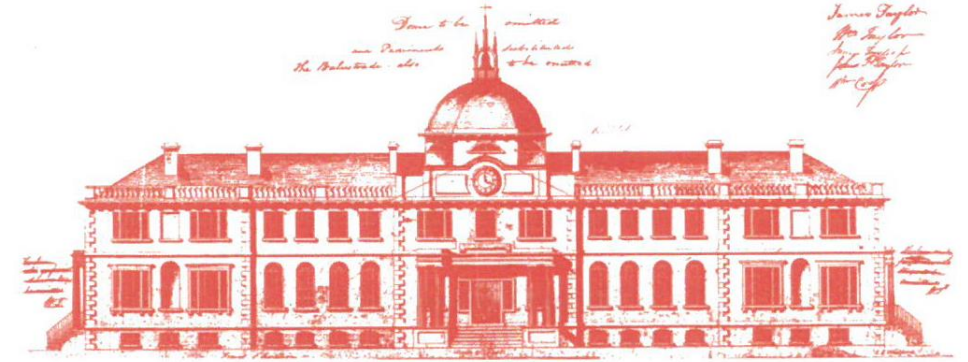
Fields Academy graduate courses, 2021.

CMS (Canadian Mathematical Society) summer meeting, Spring 2018.

## **Equivariant KK-theory and its application in Index theory**

### **Abstract**

In this thesis, using the calculation of a couple of Kasparov products of asymptotically equivariant cycles, we find the index of an asymptotically equivariant Dirac-Schrodinger operator on a Hyperbolic manifold. In fact, using the calculation of the Kasparov products of a couple of asymptotically equivariant cycles, we reduce the problem of finding the index to the case in which the manifold is compact and so the problem reduces to the Atiyah-Singer index theorem.



*Home of the School of Graduate Studies, Sir Howard Douglas Hall was designed by J.E. Woolford in 1825 and is the oldest university building in Canada still in use.*

*The University of New Brunswick recognizes that the university sits on traditional Wolastoqey territory. The river that runs right by our university – the St. John River – is also known as Wolastoq, along which live the Wolastoqiyik -- the people of the beautiful and bountiful river.*

# **UNIVERSITY OF NEW BRUNSWICK SCHOOL OF GRADUATE STUDIES**

**ORAL EXAMINATION**

**Yavar Abdolmaleki**

**IN PARTIAL FULFILMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF**

**DOCTOR OF PHILOSOPHY**