

# Alberta Number Theory Days XI (ANTD XI)

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## 1 Introduction

Number theory is a broad and central area of research with many connections and applications to other areas of mathematics and science. It is also an extremely active and diverse area of research. The subject may be divided into several subdisciplines that range from pure mathematics, to more applied areas such as cryptography, computational number theory, and mathematical physics. Some of the pure mathematics subdisciplines are algebraic number theory, arithmetic geometry, analytic number theory, automorphic forms, and representation theory.

Alberta Number Theory Days allows for face-to-face discussion between peers and facilitates collaboration between researchers within the province as well as distinguished out of province participants. As our Albertan universities are far from each other, it is impractical to run a weekly or bi-weekly number theory seminar. Instead this conference allows the community of Alberta number theorists to gather once a year to discuss the latest advances in the field, and in their own research. New connections are made and old associations are renewed, and these personal interactions lead to the conception of new projects. It also allows for the exchange of knowledge, which improves the progress of ongoing projects. Another goal is to provide opportunities for young researchers to present some of their early mathematical work.

This was the eleventh edition of Alberta Number Theory Days. Previous conferences took place in Lethbridge (2008), Calgary (2009), and BIRS (2010, 2011, 2013, 2014, 2015, 2016, 2017, 2018). Moreover, in June 2016, the fourteenth meeting of the Canadian Number Theory Association (CNTA) was hosted by the University of Calgary, with approximately 175 participants.

## 2 Outcome of the Meeting

This year, the meeting had a total of eleven talks. One was a plenary lecture given by an out-of-province and well-established researcher. Eight talks were given by faculty members and postdocs from UAlberta, UCalgary, ULethbridge, UBC, and UNBC, and two talks were given by graduate students from UAlberta and UCalgary.

Our success in providing early-career researchers with access to a nourishing research environment is reflected in the participant pool. Indeed, out of the 31 participants, 6 were postdoctoral fellows, and 7 were graduate students. All main Alberta number theory centres were well-represented: 7 participants were from Edmonton, 11 were from Calgary, and 8 were from Lethbridge. Comments made in conversations after the

conference suggested that we also achieved the goal of improving connections among number theorists in the region.

### 3 Diversity and Inclusion

We strive to improve participation of underrepresented groups in mathematics. We are pleased to report that the plenary lecture was given by a female mathematician and that out of the 11 total talks, 4 were delivered by female mathematicians. Out of the 31 participants, 9 were female and 12 were visible minorities as defined by the Government of Canada.

### 4 Highlights of the Meeting

The first highlight was the plenary talk given by Dr. Julia Gordon. Dr. Gordon is an Associate Professor at the University of British Columbia. She earned her doctorate at the University of Michigan in 2003 under the supervision of Thomas Hales. She has been recognised by several appointments and awards including: Fields Institute Postdoctoral Fellow in 2003; University of Toronto Postdoctoral Fellow 2004-2006; NSERC Accelerator Award 2015-2018; and the Michler Prize (AWM and Cornell University) in 2017. In 2019, she has been named the recipient of the Krieger-Nelson Prize by the Canadian Mathematical Society for her contributions to mathematics research.

Dr. Gordon works in representation theory of  $p$ -adic groups related to the Langlands Programme, motivic integration, the trace formula, and their applications to arithmetic questions. In particular, with R. Cluckers and I. Halupczok, Dr. Gordon used techniques from the theory of motivic integration to derive uniform estimates for orbital integrals, which have applications to certain L-functions. Furthermore, with J. Achter and S.A. Altug, Dr. Gordon applied the theory of motivic integration to connect different ways of computing the sizes of isogeny classes of abelian varieties. This joint work was the main topic of her inspiring plenary lecture.

In addition to the plenary lecture, there were 10 excellent talks by Sumin Leem (UCalgary), Jonathan Webster (UCalgary), Jack Klys (UCalgary), Adam Topaz (UAlberta), Karol Koziol (UAlberta), Jamie Juul (UBC), Amir Akbary (ULethbridge), Alia Hamieh (UNBC), Nitin Jumar Chidambaram (UAlberta), and Andrew Fiori (ULethbridge).

The plenary lecture and all of the above talks covered many aspects of modern number theory and presented several interesting directions and open problems for future research. Videos of the plenary lecture and several of the talks are available at [www.birs.ca/videos/2019](http://www.birs.ca/videos/2019). The following are papers related to some talks given at the meeting. Other talks involve ongoing projects for which published papers or preprints are not yet available.

### References

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