

Martin van Beek

PERSONAL INFORMATION

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EDUCATION

SEPTEMBER 2017 - JULY 2022 PhD in Pure Mathematics
DEFENDED DECEMBER 2021 University of Birmingham
Thesis: Local Group Theory, The Amalgam Method, and
Fusion Systems
Supervisor: Prof. Chris Parker

OCTOBER 2016 - JUNE 2017 Master of Advanced Study in Mathematical Sciences
University of Warwick
Classification: Masters with Distinction
Thesis: Properties of the 7-Sphere
Supervisor: Prof. Dmitriy Rumynin

SEPTEMBER 2012 - JULY 2016 Bachelors of Science in Mathematics
University of Glasgow
Classification: Honours of the First Class
Thesis: The Large Mathieu Groups
Supervisor: Dr. Andrew Baker
Awards: Dougall Prize 2015

RESEARCH INTERESTS

I am currently interested in local group theory, specifically through the lens of saturated fusion systems over p -groups and their interactions with group amalgams. In fusion systems, my current research focuses on recognizing the p -fusion categories of simple groups of Lie type from prescribed local actions. Alongside this, I am interested in exotic fusion systems at odd primes, and the applications of fusion systems to representation theory and homotopy theory.

EMPLOYMENT

OCTOBER 2022 - HEILBRONN FELLOW AT THE UNIVERSITY OF MANCHESTER
PRESENT

The aim of this research is two-fold. Firstly, to work towards recognizing the p -fusion category of the groups of Lie type via the construction and recognition of parabolic systems in fusion systems, and ultimately to classify large families of fusion systems of parabolic characteristic p . Secondly, to uncover exotic fusion systems on p -groups, for p an odd prime, with the goal of identifying distinguishing features of exotic fusion systems when compared to p -fusion categories of finite groups.

NOVEMBER 2021 - RESEARCH ASSOCIATE AT THE UNIVERSITY OF BIRMINGHAM
OCTOBER 2022

I was funded by the EPSRC for 12 months to facilitate research pertaining to saturated fusion systems. During this time, I discovered new exotic fusions systems which are related to Sporadic simple groups, completely determined a large class of fusion systems supported on certain Sylow p -subgroups of a simple group of Lie type of rank two, and began the groundwork on describing fusion systems which contain a parabolic system.

TEACHING

- 2017 - 2021 POSTGRADUATE TEACHING ASSISTANT AT THE UNIVERSITY OF BIRMINGHAM
- My responsibilities included leading and supporting in problem classes, and marking assignments and homework.
- 2017 - 2021 MATHEMATICS SUPPORT CENTRE TUTOR AT THE UNIVERSITY OF BIRMINGHAM
- My responsibilities included assisting undergraduates who were taking a wide range of courses in mathematics and other sciences, in a drop in session type environment.
- Summer 2019 A2B SUPERVISOR AT THE UNIVERSITY OF BIRMINGHAM
- My responsibilities included supervising the summer projects of various secondary school students transitioning to university, and marking the final projects.

SELECTED PUBLICATIONS AND PREPRINTS

Books:

1. Rank 2 Amalgams and Fusion Systems, ~ 200 pp., ([Arxiv](#)), *Lecture Notes in Mathematics*, Springer, (2024)

Articles:

1. Fusion Systems on a Sylow p -subgroup of $G_2(p^n)$ or $PSU_4(p^n)$ ([Arxiv](#)), *Journal of Algebra*, (2023)
2. Exotic Fusion Systems Related to Sporadic Simple Groups, ([Arxiv](#)), *Submitted*
3. Fusion Systems on Sylow p -subgroups of Rank 2 Simple Groups of Lie Type, ([Arxiv](#)), *Submitted*

SELECTED TALKS GIVEN

- “Fusion Systems and Rank 2 Amalgams”*
Groups, Representations and Applications - Isaac Newton Institute - July. 2022
“Fusion Systems and Rank 2 Amalgams”
([YouTube](#))
- Groups St Andrews - Univ. of Newcastle - Aug. 2022
“Exotic Fusion Systems Related to Sporadic Simple Groups”
- Algebra Seminar - Univ. of Manchester - Oct. 2022
“Fusion Systems and Rank 2 Amalgams”
- Groups and Topological Groups Conference - Univ. Halle-Wittenberg - Feb. 2023
“Saturated fusion systems and rank two simple groups of Lie type”
- Algebra Seminar - Univ. of Louisiana - Feb. 2023
“Saturated fusion systems and rank two simple groups of Lie type”
- Algebra Seminar - Univ. of Warwick - Nov. 2023
“Exotic Fusion Systems Related to Sporadic Simple Groups”

CONFERENCES AND SEMINARS (CO-)ORGANIZED

Patterns in Exotic Fusion Systems - Univ. of Birmingham - May 2023
(Funded by the Heilbronn Institute)

Postgraduate Group Theory Conference - Univ. of Birmingham - Jul. 2019
(Funded by the LMS and Heilbronn Institute)

FUNDING

Heilbronn Focused Research Grant - £6000 - March 2023
(Joint with Prof. Chris Parker)

SELF STUDY, INTERESTS AND HOBBIES

When I am not working I like strength training in my local gym. On top of this, I am a keen racket sports player, participating in and organizing weekly badminton and squash games. When the weather is nice, I enjoy playing football casually, and when the weather is not so nice, I spend more time in the swimming pool.

I am an enthusiastic drummer, having played regularly (and taught infrequently) since I was eight years old.