Reports of Sponsored Meetings

Reports received of sponsored meetings held in 2023:

Groups in Galway 2023
May 18–19, 2023, University of Galway

The 2023 instalment of the series of meetings "Groups in Galway" took place at the University of Galway on May 18–19, 2023. This was the first in-person Groups in Galway after two online editions due to the pandemic (2020, 2021) and a special joint meeting of "Groups in Galway" and the "Irish Geometry Conference" (2022).

The meeting was organised by Angela Carnevale and Götz Pfeiffer, and was supported by the Irish Mathematical Society and by the Office of the Registrar and Deputy President of the University of Galway. There were 9 talks over three sessions, and over 30 participants.

Speakers and talks:

- Naomi Andrew (University of Oxford): *Automorphisms of groups and actions on trees*
- Javier Aramayona (ICMAT Madrid): *Asymptotically rigid mapping class groups*
- Ilaria Castellano (Bielefeld University): *Coxeter groups with more than two ends and groups acting on buildings*
- Leo Margolis (Universidad Autónoma de Madrid): *Modular Isomorphism Problem - progress, solution and open challenges*
- Padraig Ó Catháin (Dublin City University): *Monomial actions, group cohomology and complex Hadamard matrices*
- Colva Roney-Dougal (University of St Andrews): *Base size and relational complexity*
- Tobias Rossmann (University of Galway): *Orbits of unipotent groups: tame vs wild*
- Yuri Santos Rego (Otto-von-Guericke University Magdeburg): *Navigating the galaxy of Coxeter groups*
- Gerald Williams (University of Essex): *Generalized polygons and star graphs of cyclic presentations of groups*

The conference website `https://angelacarnevale.github.io/gig23/` contains abstracts of the talks and further information.

Report by Angela Carnavale, University of Galway
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Nonlinear Dispersive Waves
April 24–25, 2023, University College Cork

A workshop took place at the School of Mathematical Sciences, UCC, from April 24^{th}–25^{th}. This workshop addressed some recent mathematical developments in the broad field of nonlinear dispersive waves, with a particular emphasis on waves arising in the ocean and atmosphere. It featured 12 international mathematicians as invited speakers, whose research backgrounds span the spectrum from pure to applied mathematics. The workshop was run on a hybrid-basis, achieving a global reach of over 60 participants from 17 countries (and 6 continents!), with thankfully many participants making it to Cork in

person. The speakers and their talks are listed below, while abstracts can be found at: `https://www.ucc.ie/en/media/academic/maths/pdfs/Workshop-Programme.pdf`

Nonlinear Dispersive Waves Participants

- Didier Clamond (Université Côte d'Azur): *On the recovery of rotational gravity waves from the seabed pressure*
- Adrian Constantin (University of Vienna): *Frictional effects in wind-driven ocean currents*
- Olivia Constantin (University of Vienna): *A complex analytic approach to some problems in fluid flows*
- Joachim Escher (Leibniz University Hannover): *The Rayleigh–Taylor Condition for the Muskat Problem*
- Delia Ionescu-Kruse (Institute of Mathematics of the Romanian Academy): *On the short-wavelength stabilities of some geophysical flows*
- Rossen Ivanov (TU Dublin): *Modelling internal waves over variable bottoms*
- David Lannes (University of Bordeaux): *Wave structure interaction in the Boussinesq regime*
- Bogdan Matioc (University of Regensburg): *Stratified Periodic Water Waves with Singular Density Gradients*
- Emilian Parau (University of East Anglia): *A dissipative nonlinear Schrodinger model for wave propagation in the marginal ice zone*
- Jens Rademacher (University of Hamburg): *Rotating convection with kinetic energy backscatter*
- Raphael Stuhlmeier (University of Plymouth): *A discrete Hamiltonian perspective on the classical instabilities of deep-water waves*
- Samuel Walsh (University of Missouri): *Desingularization and global continuation for hollow vortices*

These scientific talks—and the resulting discussions and interactions—were greatly enjoyed by a diverse audience ranging from graduate students, upwards. The workshop was kindly funded by the School of Mathematical Sciences in UCC, the Irish Mathematical Society, and the Science Foundation Ireland, all of whose support is gratefully acknowledged. The proceedings of this workshop will be published in a forthcoming book volume by Birkhäuser.

Report by David Henry, University College Cork
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Key Lemmas in Analysis and Dynamics
January 16–20, 2023, University College Dublin

The workshop "Key Lemmas in Analysis and Dynamics" took place at University College Dublin during 16th-20th January, 2023. The workshop, which was organised by Neil Dobbs and Myrto Manolaki from UCD, covered a variety of topics including Complex Analysis, Approximation Theory, Holomorphic Dynamics and Ergodic Theory. Its goal was to bring together early career and more established mathematicians to discuss challenging research problems and important mathematical tools used in these areas. There were 14 talks spread over 4 days and one day of excursion in Glendalough. Over 15 people attended the meeting. The organisers acknowledge financial support by the UCD School of Mathematics and Statistics and by the Irish Mathematical Society.

Participants in Key Lemmas Workshop

Speakers and titles of talks:

- **Neil Dobbs (UCD, Ireland):** *Hausdorff dimension and Julia sets (part I and II)*
- **Vasiliki Evdoridou (Open University, UK):** *Constructing oscillating wandering domains (part I and II)*
- **Gabriella Keszthelyi (Renyi Institute of Mathematics, Hungary):** *Dynamical properties of biparametric skew tent maps*
- **Alexey Korepanov (Loughborough University, UK):** *Mixing for the measure of maximal entropy for dispersing billiards (part I and II)*
- **Matteo Lotriglia (UCD, Ireland):** *On Class B Functions and the Area of their Julia Set*
- **Myrto Manolaki (UCD, Ireland):** *What can Potential Theory tell us about the boundary behaviour of holomorphic functions?*
- **Konstantinos Maronikolakis (UCD, Ireland):** *Properties of Abel universal functions*
- **David Marti-Pete (University of Liverpool, UK):** *Constructing entire functions with wandering continua (part I and II)*

- **Nina Snigireva (Atlantic Technological University, Ireland):** Noncontractivity in Fractal Geometry
- **Matteo Tabaro (Imperial College London, UK):** *Semi-Hyperbolicity Implies Existence of ACIPs for Real Multimodal Maps*

	Monday	Tuesday	Wednesday	Thursday	Friday
09:45-10.30	opening + coffee/tea	excursion (Maths in nature)	coffee/tea	Nina Snigireva	Matteo Lotriglia
10:30-11.00				coffee/tea	coffee/tea
11.00-11.45	Matteo Tabaro		Vasiliki Evdoridou	Vasiliki Evdoridou	Neil Dobbs
12.00-12.45	Myrto Manolaki		David Marti-Pete	David Marti-Pete	Alexey Korepanov
13.00-15.00	lunch		lunch	lunch	lunch
15.00-15.45	Gabriella Keszthelyi		Alexey Korepanov		
16.00-16.45	Neil Dobbs		Konstantinos Maronikolakis		
19.00-21.00				dinner	

For further information, please check the conference website:
`https://maths.ucd.ie/~ndobbs/KLAD2023/index.html`

Report by Neil Dobbs and Myrto Manolaki, University College Dublin
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Research in Mathematics Education in Ireland (MEI 9)
October 13–14, 2023, Maynooth University

The 9th conference on Research in Mathematics Education in Ireland (MEI 9) took place at the Institute of Education, St Patrick's Campus, DCU and focussed on the theme *Conceptualising Success in Mathematics Education*. It served to promote and facilitate discussion on mathematics teaching and learning across the continuum from early childhood education to third level education.

MEI Panellists

The keynote addresses were delivered by Prof Susanne Prediger (TU Dortmund) and Dr Niamh O'Meara (University of Limerick) whose talks were entitled

> *From task completion to learning progress: Shifting mathematics teachers' conceptualisations of success as a key challenge in professional growth*

and

> *What constitutes success in mathematics education in Ireland and what obstacles stand in the way of this success: A decade in review*

respectively. Over 90 national and international participants, including those from Germany, Norway and the United States, were in attendance. Teachers, academics, members of the teacher support services and policy makers participated in the conference.

The conference featured over 25 contributed talks, poster presentations and a panel discussion on *What counts as success in the assessment of mathematics?* The panel chair, Dr Joe Travers, is pictured with panellists Drs Gerry Sheil, Thérèse Dooley, Vasiliki Pitsia and Zita Lysaght below.

Also included in the conference were two symposia (one entitled *Mathematics Learning Support: where we have been, where we are now, where we are going* and the other *Conceptualising success for mathematics in modernity: Augmented reality, datascience and integrated STEM*).

Further details on the conference, including abstracts for the papers and posters presented, can be found on the conference website:
`https://sites.google.com/dcu.ie/meiconference/mei-9`.

The organisers would like to sincerely thank the Irish Mathematical Society for their support.

Report by Sinéad Breen, Dublin City University
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Sixth Irish History of Mathematics Conference
August 30, 2023, Maynooth University

The 6^{th} Irish History of Mathematics Conference (IHoM6) was held in Renehan Hall at Maynooth University on Wednesday, August 30th. The organising committee was led by Ciarán Mac an Bhaird and also consisted of Mark McCartney (Ulster University) and Maurice OReilly (DCU).

The meeting was well attended, with more than 30 individuals in attendance at different times of the day. There was more international engagement than with previous IHoM conferences probably due to the other HoM events runnning at Maynooth that week. On Tuesday, Maynooth hosted the first workshop of the *History for Diversity in Mathematics Betwork* (https://mathshist4edi.wp.st-andrews.ac.uk/). On Wednesday evening, following IHoM6, and continuing on Thursday and Friday, we also had the *Consonances: Mathematics, Language, and the Moral Sense of Nature* Conference.

IHoM6 had nine talks across different aspects of the HoM. The list of all talks is as follows:

- Hadamard's Determinant Inequality - Padraig Ó Catháin
  Abstract A famous inequality due to Hadamard in 1893 establishes a bound for the determinant of a matrix in terms of an upper bound on the matrix entries. To the modern reader, the proof is curious as it uses techniques of nineteenth

century determinant theory, rather than results about inner product spaces. We will trace the historical development of this result and its generalisations, comparing nineteenth and twentieth century proof techniques, and concepts of proof.

- An enlightened archbishop: collecting mathematics in the Bolton Library - Olivia Lardner
  Abstract - The core of what has become known in the 21st century as the Bolton Library – formerly Cashel Cathedral Library – was circa 75 years in the making, collected by two Irish men across the island of Ireland between 1669–1744, with activity in each of the four provinces. They would both go on to become Church of Ireland archbishops: William King (1650-1729) in Dublin and the eponymous Theophilus Bolton (-1744) in Cashel. Little research has been undertaken on the collecting activities of the latter, but a wealth of information exists on that of the former, due in the main to his own assiduous marking of and reflections on items acquired across 50 years of collecting activity. This talk will look at three mathematical volumes - two manuscripts and one early printed book - acquired by Archbishop King during this Age of Enlightenment.

- On Newton's series for sine and arcsine - Piotr Błaszczyk
  Abstract We analyze Newton's Two Treatises of the Quadrature of Curves and Analysis by Equations of an Infinite Number of Terms from the perspective of mathematical techniques. On pages 336–338 of the 1745 edition, Newton derives series for sine and arcsine. To this end, he employs Euclidean proportion, Cartesian understanding of proportion in terms of the arithmetic of line segments, and Cartesian interpretation of the Pythagorean theorem, infinitesimals, formal power series, and binomial theorem – the technique exposed by every modern commentary. Moreover, Newton refers to the Euclidean concept of magnitudes of different kinds, which allows him to apply different units, namely infinitesimal unit line and the unit within – say – usual line segments. We focus on the technique of formal power series, which enables Newton to determine the derivative – to phrase it in modern terms – of the inverse function. Finally, we contrast Newton's derivation of the series for arcsine with modern calculus and show that the so-called arithmetization of calculus is not a complete success.

- Who was J. Walton, Berkeley's Dublin antagonist? - Roderick Gow
  Abstract In 1734, an anonymous pamphlet entitled *The analyst: or a discourse addressed to an infidel mathematician* was published separately in Dublin and London. The work had an immediate impact and, although anonymous, it was rapidly surmised that its author was George Berkeley, who had been appointed to the bishopric of Cloyne a month or two earlier. Not the least part of its impact derived from the implied criticism of Newton's method of fluxions. It provoked a brief pamphlet war from supporters of Newton, with the occasional anonymous reply from Berkeley. Our interest is centred on two pamphlets written by a certain J. Walton, also published in Dublin and London, in 1735. One is *A vindication of Sir Isaac Newton's principles of fluxions*, the other *The catechism of the author of the minute philosopher fully answer'd*. The question we wish to raise here is: who was J. Walton? It is surprisingly difficult to give a conclusive answer, and other investigators have failed in the endeavour, not least even to identify the name signified by the initial J. Sufficient information has emerged to suggest that Walton was a wealthy man with scientific interests

and connections to leaders of Dublin society, but virtually unknown to historians.

- Potential Approaches to the Theory of Proportionality in Ancient Greek Geometry - David Wilkins
  Abstract This presentation seeks to explore the potential for geometric approaches to proportionality in the development of ancient Greek geometry prior to the establishment of the theory of proportionality attributed to Eudoxus. The aim is to show that, if appropriate geometric criteria are taken to represent proportionality, when applied in the context of straight line segments and parallelogrammic areas, then the majority of the propositions in Book 6 of Euclid's Elements of Geometry could be proved, consistent with the standards of proof typical of ancient Greek geometry, on the basis of the concepts, propositions and proof techniques exhibited in the first four books of Euclid's Elements. Such an approach should not introduce any logical dependence on the contents of Book 5 that present the theory of proportionality traditionally attributed to Eudoxus.

- Euclid's Elements in Irish: A 19th century tale - Ciarán Mac an Bhaird
  Abstract Special Collections in the University College Dublin (UCD) Library holds a manuscript which includes, amongst other non-mathematical material, approximately sixteen pages of Euclid's Elements written in old script (seancló) Irish. In this talk I will consider the contents of these pages which seem to have been written by the Irish language scholar John O'Donovan (Seán Ó Donnabháin) around the middle of the 19th century. We will look at Eoin MacNeill's commentary on O'Donovan's text in the Gaelic Journal (Irisleabhar na Gaedhilge) in the 1890's, which paid particular attention to the Irish words chosen by O'Donovan. We will also briefly outline the careers of the people involved, including O'Donovan, MacNeill, and James O'Laverty as we try to identify why these pages were written in the first place, and their curious route, via Belfast, to UCD.

- Considering conics: reading Apollonius in the collections of Marsh's Library - Sue Hemmens
  Abstract The seventeenth century saw a sustained fascination with the treatise on conic sections by the 'Great Geometer' Apollonius of Perga (c.240C–c190BCE). Characterised by some as the first significant advance in geometry since Euclid, Apollonius' writings were known to the Islamic world and subsequently rediscovered in Western Europe during the Renaissance where they formed the basis of many subsequent developments. Narcissus Marsh (1638–1713) is known to have been deeply interested in mathematics in general. He made extensive notes using his copy of La Hire's 1685 edition of Apollonius. Marsh also owned an important Arabic manuscript, now held in the Bodleian Library, which was used by Edmund Halley in preparation of his edition of the Conics, including a reconstruction of the 'lost book'. This paper will discuss the reception and reading of Apollonius as reflected in the collections of Marsh's Library.

- The Lion, the Witch & the maths graduate: studying maths at Queen's College, Belfast in the 1880s - Mark McCartney
  Abstract The 1880s saw the dissolution of the Queen's University of Ireland, the formation of the Royal University of Ireland, and the admission of women as students to Queen's College Belfast. This talk will look at the mathematics curriculum and examinations around that time and aspects of the lives of Florence

Hamilton and Alice Everett.

- What's happening in the History of Mathematics Education? Perspectives from ICHME7 - Maurice OReilly
  Abstract In September 2022, the seventh International Conference on the History of Mathematics Education (ICHME7) took place over five days in Mainz, Germany, where 32 papers were presented. In an attempt to give an overview of areas of current interest in the field, I review a selection of the presentations under six headings. These are: pre-Enlightenment texts on mathematics, the emergence and development of engineering mathematics in military contexts in the 18th and 19th centuries, teaching mathematical analysis in the 19th century, school geometry in the 19th and early 20th centuries, international networks concerning mathematics teaching, and, last but by no means least, the advent and reception of the New Math from the 1960s. This review anticipates the publication of the ICHME7 proceedings at the end of August (see https://ichme7.uni-mainz.de/)

The organisers would like to thank the administrative and technical staff in the Department of Mathematics and Statistics for all their assistance, both Conference and Accommodation and Catering at Maynooth for their support, all speakers and participants, and finally the IMS for providing funding.

Report by Ciarán Mac an Bháird, Maynooth University
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