NEWTON INSTITUTE SATELLITE WORKSHOP: GEOMETRIC AND CATEGORICAL LIE THEORY

The programme had 50 visiting academics (including 5 ICM speakers) from across the USA, Australia, Europe and the UK. We had academics from across a broad range of career levels and a strong gender balance. The programme ran over four weeks, with the second week highlighted by the workshop Modular Lie Theory at the University, the fourth week had a 2-day conference at the historic Guildhall, and we also had daily lectures in weeks 1 and 3. These conferences, the daily talks, the poster session, and the other scheduled social events (the wine reception and barbecue in week 1, the conference dinner in week 2, the curry lunch in week 3, and the 2 days conference in week 4) proved to be a catalyst for numerous stimulating discussions and new collaborations. Many participants remained for extended stays of three to four weeks, including our Simons and Heilbronn Fellows: Maud De Visscher, Hankyung Ko, Andrew Mathas, Rob Muth, Jay Taylor, and Dani Tubbenhauer. Their longer presence was particularly valuable in driving sustained collaboration and deepening research exchanges. The programme provided an ideal setting for both initiating and advancing projects. Several long-term and new collaborations in particular flourished:

- Bate–Taylor–Thomas and Bate–Stewart–Thomas made substantial progress on new projects and have already scheduled follow-up meetings to continue their work on structure theory of (pseudo)-reductive groups.
- Bate–Martin–Roehrle successfully completed and submitted their book to their editors, they were aided during their time at York by insightful discussions with Sean Cotner.
- Geranios–Muth and Geranios–Donkin made significant headway on long-standing collaborative projects on the structure of Hecke algebras and algebraic groups.
- Bowman–De Visscher–Muth–Poulain D'Andecy launched a new project on orientifold quiver Hecke algebras, shedding light on their structure for the first time — their collaboration benefited greatly from discussions with Paul Martin in the second week. They plan to pursue this further in the autumn during the $1.5M ICERM trimester programme, which aligns closely with the themes of our INI programme.
- Bowman–Muth–Speyer–Sutton made significant headyway on their joint project, which they will also push forward at ICERM.
- Bowman–De Visscher–Hazi–Stroppel achieved a breakthrough in their work on singular Hecke categories, with Ko's expertise providing key insights.
- Mathas–Muth–Tubbenhauer began collaborating following Mathas' lecture on KLRW algebras.
- Mathas–Stroppel devoted much of the four weeks to advancing their ongoing joint project on KLR algebras and their deformations, they were significantly aided in their work by conversations with Muth.
- Taylor–Thomas brought a three-year project to completion, which Kessar suggested was of such importance that it merits submission to Inventiones Mathematicae.

The atmosphere of concentrated research, combined with the rich interplay of ideas, made the programme a powerful driver of mathematical discovery.

In the final week we also had a (separately funded) 2 day conference to celebrate the launch of the new EPSRC "UK-EU representation theory and categorification network" in partnered with Jane Street Capital, Microsoft LEAN, The British Science Association, and The Heilbronn Institute. These two days served as an incubator for the network, bringing together the organisers of the UK-component (Kessar and Bowman) as well as the sister German network (Malle) and a broad range of active representation theorists who will be supporting the network — several future events were planned (including a one week conference in Corsica in 2028, one week events at the ICMS in Edinburgh in 2026 and 2027, and a one week event in York in 2026).