THE INTERPLAY BETWEEN SKEW BRACES AND HOPF-GALOIS THEORY

KEELE UNIVERSITY
DENISE COATES FOUNDATION BUILDING,
ROOMS LG008 AND LG009
WEDNESDAY 3RD AND THURSDAY 4TH SEPTEMBER, 2025

SCHEDULE

Wednesday 3rd September

14:00 Andrew Darlington: *Hopf-Galois theory and Cunningham chains*
15:00 Gareth Tracey: *On the Hasse-Norm Principle*
16:00 Tea
16:30 Hal Simpson: *Bicyclic biskew braces*

Thursday 4th September

09:30 Isabel Martin-Lyons: *A review of the theory of skew bracoids*
10:30 Coffee
11:00 Paul Truman: *Skew braces and abelian maps on groups of squarefree order*

ABSTRACTS

Andrew Darlington, Vrije Universiteit Brussel
Hopf-Galois theory and Cunningham chains
50 Minutes
Andrew.Darlington@vub.be

The classification of Hopf-Galois structures on different families of field extensions is a fruitful approach for the latter object's study. In the case that the extension is separable, the corresponding Hopf-Galois structures have been shown to relate to certain transitive permutation groups of degree equal to that of the extension. The first half of this talk will give a review of the machinery involved, with the second half presenting an application of the theory to separable extensions of degree related to special sequences of primes called Cunningham chains.

Isabel Martin-Lyons, Keele University
A review of the theory of skew bracoids
50 Minutes
I.D.Martin-Lyons@Keele.ac.uk

The skew bracoid is an algebraic object which generalises the skew brace and comprises two groups that interact via a transitive action. In this talk, we give an overview of the theory of skew bracoids, placing them in various webs of correspondences which connect skew bracoids to, for example, Hopf-Galois structures on separable extensions of fields, solutions to the set-theoretic Yang-Baxter equation, and transitive subgroups of the holomorph of a group. We also discuss open questions in the field, including potential applications of skew bracoids to pre-existing questions and where the theory of related objects may enrich the theory of skew bracoids.

Hal Simpson, Keele University / University of Leeds
Bicyclic biskew braces
50 minutes
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Skew braces are an algebraic structure with close historical and practical ties to the set-theoretic Yang-Baxter equation. We will discuss existing results about skew braces, covering gamma functions, the connection between skew braces and regular subgroups of the holomorph of a group, results about bi-skew braces, and ideals. We will use this to completely classify the finite bicyclic skew braces, and, among them, which are bi-skew.

Gareth Tracey, University of Warwick
On the Hasse-Norm Principle
50 minutes
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One of the 20^{th} centuries most famous local-global theorems is due to Hasse, who proved that for a cyclic extension L/K of number fields, an element of K is a global norm if and only if it is a local norm everywhere. This is no longer true if the extension L/K is abelian, but the question remains: for which extensions L/K of number fields is it true that an element of K is a global norm if and only if it is a local norm everywhere? In this talk, we will give an account of this problem, focusing on history, motivation from geometry, and techniques from finite group theory which have led to some recent progress.

Paul Truman, Keele University

Skew braces and abelian maps on groups of squarefree order

50 minutes

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An abelian map on a group $(G, \cdot)$ is an endomorphism with abelian image. Each abelian map on $(G, \cdot)$ leads naturally to a binary operation $\circ$ on G such that $(G, \cdot, \circ)$ is a skew brace. It is therefore interesting to try to classify abelian maps on various families of groups. We give a summary of this theory and classify the abelian maps on groups of squarefree order.