NZMASP highlights

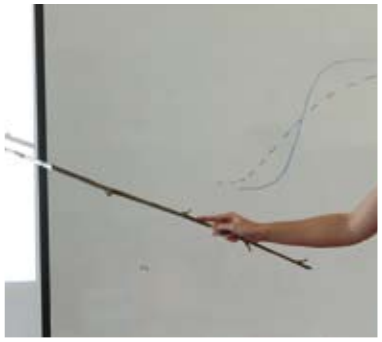




More than 60 Mathematics and Statistics students from universities around the country attended the second New Zealand Mathematics and Statistics Postgraduate (NZMASP) Conference in Whitianga on the Coromandel Peninsula in November.









Student talks at the meeting ranged from Representation to Queueing theory, from Phylogenetics to Topology. The quality of presentations was high, with all students managing to explain their work to a varied audience.





The University of Canterbury again ruled the awards; Mareike Fischer's presentation on DNA sequences won the NZIMA Best Presentation Award, while Johnny Humphries' presentation on nesting polynomials earned him the Peoples' Choice Award.







Vertices edges and faces

French-speaking Belgian Alice Devillers, who is based at the University of Western Australia, was collaborating with the NZIMA Co-Director, Professor Marston Conder, during her visit to New Zealand early this year. She spoke with Jenny Rankine.

They were trying to find chiral polytopes in higher dimensional spaces with maximum symmetry. Each polytope has an automorphism group - a set of symmetries in which the form is mapped onto itself while preserving the incidence of faces - and a figure is chiral if it cannot be mapped to its mirror image by rotations and translations alone.

Helices such as screws and propellers, and Möbius strips, are chiral objects in three-dimensions.

Examples of chiral polytopes with maximum rotational symmetry are known in three, four and five dimensions. Devillers and Conder have now found examples in six, seven and eight dimensions; "We hope to be able to generalize," says Alice.

"It could be that eight is the biggest; it's hard to tell. It is a very big problem for a computer." The two are studying the output of computations to look for patterns, which could be extended.

"Computers lead us in the right direction and give examples, but never provide proof unless it is a finite question and you have all the examples."

"It's a bit like detective work, a combination of investigating examples to prove general results; you go back and forth between the two."

Permutation groups - where elements of a set are exchanged or permuted - can also be applied to other geometries. "I like geometries because I can draw them, they are concrete objects." In Perth, Devillers focuses on graphs, which are combinations of vertices and edges.

She is classifying locally s-distance transitive graphs. For these, the set of automorphisms fixing any vertex v has a single orbit on the vertices at distance 1 from v, on those at distance 2, and so on up to distance s.

Devillers liked maths from early in her schooling. "I did the national maths Olympiads every year from 13 to 18 in Belgium and went to one International Mathematical Olympiad. I do it because it's beautiful."

"It's the essence of science, the most precise. Either it's true or it's not. Some axioms are assumed, but that's always stated. The real work is always thinking. It's universal, you can explain it to any mathematician in the world, or any other world."

"And it's not just about proving theorems, but providing the best definition. Sometimes proofs are ugly, but another proof for the same theorem may be more elegant."