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**JON YARD**, University of Waterloo and Perimeter Institute

*On the existence of symmetric quantum measurements*

Optimal symmetric quantum measurements, known as SIC-POVMs (Symmetric Informationally Complete Positive Operator-Valued Measures), are currently proved to exist in only finitely many dimensions as orbits of finite Heisenberg groups. Surprisingly, these examples are always defined over explicit class fields of certain real quadratic fields. They possess combined Galois and unitary symmetries which, when better understood, may lead to a general existence proof in all dimensions. In this talk, I will discuss aspects of these symmetries as well as a conjecture that such measurements determine maximal volume simplices embedded into the space of density matrices.