Algebra and Number Theory Seminar

Title: Matrices of algebraic integers in multiantenna communication

Speaker: Jyrki Lahtonen (University of Turku, Finland)

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Location: Mathematical Sciences Seminar Room

Abstract: Algebraic number theory has proved to be a useful tool in the design of lattices suitable for multiantenna communication. Cyclic division algebras over a numbeer field proved to be very useful in the case of point–to–point communication (aka single user MIMO). More recently constructions depending on algebraic number fields have also been proposed for multiple access applications, where two or more users use the same radio resource simultaneously. In the single user case there is a well understood notion of the trade–off between the available code rate and its diversity (=a figure of merit describing the reliability of the communication system). We shall review the concepts and results of that theory, and the role played by constructions based on algebraic numbers. In the multi–user case similar trade–off results have been presented, but the theory is less clear. Some of the results depend on the properties of the rate of decay of the determinants of the code matrices. In this talk I will discuss some preliminary general results, and thoroughly dissect a simple promising code. Diverse simple techniques such as the pigeon hole principle, Diophantine approximation, and elementary Galois theory prove to be useful.