Lethbridge Number Theory and Combinatorics Seminar

Monday — November 23, 2015
Room: C630
Time: 12:00 to 12:50 p.m.

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Isotropic quadratic forms and the Borel chromatic number of quadratic graphs

Abstract: For a field $F$ and a quadratic form $Q$ defined on an $n$-dimensional vector space $V$ over $F$, let $G_Q$, called the quadratic graph associated to $Q$, be the graph with the vertex set $V$ where vertices $v, w$ in $V$ form an edge if and only if $Q(v - w) = 1$. Quadratic graphs can be viewed as natural generalizations of the unit-distance graph featuring in the famous Hadwiger-Nelson problem. In the present talk, we will prove that for a local field $F$ of characteristic zero, the Borel chromatic number of $G_Q$ is infinite if and only if $Q$ represents zero non-trivially over $F$. The proof employs a recent spectral bound for the Borel chromatic number of Cayley graphs, combined with an analysis of certain oscillatory integrals over local fields. As an application, we will also answer a variant of question 525 proposed in the 22nd British Combinatorics Conference 2009.

EVERYONE IS WELCOME!

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