Hypoelliptic functional inequalities and applications

Nurgissa Yessirkegenov
Imperial College London and Institute of Mathematics and Mathematical Modelling, 125 Pushkin str., 050010 Almaty, KAZAKHSTAN
n.yessirkegenov15@imperial.ac.uk

In this talk we will give a review of our recent research on hypoelliptic functional inequalities. We managed to link the integral versions of Hardy inequalities on homogeneous groups to their hypoelliptic versions through the Riesz and Bessel kernels of the Rockland operators (hypoelliptic left-invariant homogeneous differential operators, following the Helffer-Nourrigat's resolution of the Rockland conjecture in the 80s). Consequently, this leads to general hypoelliptic versions of Hardy-Sobolev, Hardy-Littlewood-Sobolev, Trudinger-Moser, Caffarelli-Kohn-Nirenberg, Gagliardi-Nirenberg and other inequalities (https://arxiv.org/abs/1805.01064). We will then concentrate also on discussing their best constants, ground states for higher order hypoelliptic Schrödinger type equations, and the solutions to the corresponding variational problems (https://arxiv.org/abs/1704.01490).