Words and Waring type problems

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A classical theorem of Lagrange says that every natural number is a sum of 4 squares. Waring conjectured that every natural number is a sum of $g(k)$ kth powers, and this was proved by Hilbert and others.

We will provide background and then focus on recent non-commutative analogues of this result in Group Theory, with emphasis on word maps on finite simple groups, Lie groups, and linear groups. In particular we will discuss a recent proof of a 60 year old conjecture of Ore. We will conclude that, in some sense, the non-commutative world behaves better than the commutative world.

The lecture will be accessible to a wide audience.