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*Local-Global Principles in Orbits*

We will discuss some natural problems in arithmetic which can be (re)formulated as local-global principles for orbits of certain “thin” semigroups of integer matrix groups. Applications include partial progress towards Zaremba’s conjecture and McMullen’s “Arithmetic Chaos” Conjecture on the ubiquity of “low-lying” closed geodesics on the modular surface defined over a given number field. The main tools are expander graphs, bilinear forms, and bounds for exponential sums.

This is joint work with Jean Bourgain.