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Computing Lattice Diameters of Lattice Polygons

Motivated to count the lattice points in the intersection of a lattice polytope with an affine hyperplane, we study the 2-dimensional case, where a hyperplane corresponds to a line. A lattice diameter (for a lattice polytope P), is a line whose interesection with P has maximally many lattice points among all lines. We present an algorithm that computes all lattice diameters of a lattice polygon in polynomial time. Further, computing lattice diameters of lattice polytopes P with $dimP > 2$ is NP-hard. This is joint work with J. A De Loera, G. Lopez, and A. Torres.