1050-52-174 **Konstantin Rybnikov*** (`konstantin_rybnikov@uml.edu`), Mathematical Sciences, University of Massachusetts at Lowell, Lowell, MA 01854. *Remarkable Delaunay Polytopes derived from the Leech lattice.* Preliminary report.

Given a lattice L, a polytope D is called a Delaunay polytope if the set of its vertices is $S \cap L$ where S is a Delaunay empty sphere in L. D is called perfect if the only ellipsoid containing $S \cap L$ is exactly S. The unit interval and Gosset polytope 2_{21} are the only perfect Delaunay polytopes in dimensions 1 through 6.

We explored the geometry of 23-dimensional sublattices of the Leech lattice. Our study of such sublattices produced a number of remarkable perfect Delaunay polytopes. In particular, we find:

(1) Perfect Delaunay polytopes of lattice width 4 (the highest previously known width was 2).

(2) A perfect Delaunay polytope in a 23-dimensional lattice L which is also a perfect Delaunay polytope in a 23-dimensional superlattice of L.

(3) A perfect Delaunay polytope in a 23-dimensional lattice L whose vertex set is a *proper* subset of the vertex set of another perfect Delaunay polytope in a 23-dimensional superlattice of L.

In addition, many of the obtained Delaunay polytopes have sporadic simple groups as their isometry groups.

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