

# A Family of $p$ -Dimensional Lattices

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## Abstract

In this talk a lattice will mean a discrete subgroup  $\Lambda$  of  $n$ -dimensional Euclidean space; the sphere packing associated to  $\Lambda$  is the arrangement of congruent spheres of radius equal to one half the minimum distance of  $\Lambda$  and centered at the lattice points. The main parameter under consideration will be the packing density of the arrangement of spheres. With this in mind, a family of  $p$ -dimensional lattices will be constructed from submodules  $\mathcal{M}$  of the ring of integers of a cyclic number field  $L$  of degree  $p$ , where  $p$  is an odd unramified prime in  $L/\mathbb{Q}$ . The density of the associated sphere packing will be determined in terms of the nonzero minimum of the trace form in  $\mathcal{M}$  and the discriminant of  $L$ .