Any polyhedral decomposition of the cone of positive definite quadratic forms gives rise to a toroidal compactification of the moduli space of abelian varieties. The aim of this talk (based on joint work with Filippo Viviani, arXiv:1106.3291) is to compare two well-known such polyhedral decompositions: the perfect cone decomposition and the 2nd Voronoi decomposition.

Using the theory of regular matroids, we determine which cones belong to both the decompositions, thus providing a positive answer to a conjecture of Alexeev and Brunyate. As an application, we compare the two associated toroidal compactifications, each of which has a special role in the geometry of the moduli space of abelian varieties.