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HIGH-DIMENSIONAL SPHERE PACKINGS

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Abstract of Poster Presentation: The Apollonian circle packing, generated from four mutually-tangent circles in the plane, has inspired over the past half-century the study of other classes of space-filling packings, both in two and in higher dimensions. More recently, this has yielded a connection between n -dimensional packings and configurations of planes in \mathbb{H}^{n+1} for various quadratic forms in $n + 2$ variables. In particular, Vinberg's algorithm, in conjunction with Kontorovich and Nakamura's Structure Theorem, allows us to ask questions about whether certain Coxeter diagrams in \mathbb{H}^{n+1} for a given quadratic form admit a packing at all. Further, Kontorovich and Nakamura's Finiteness Theorem shows that there only exist finitely many classes of these packings, none of which are in dimension 21 or above. In this work, we systematically determine and enumerate all known examples of higher-dimensional sphere packings arising in this way.

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