The sphere packing project

Moritz Doll   Robert Lewis

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0.1 Introduction

The goal of this project is to formalize the proof that the E_8 lattice minimizes the density of all 8-dimensional sphere packings proved by Maryna Viazovska.

Roughly the proof consists of two steps: the first step is a reduction to finding a function that has certain Fourier theoretic properties, this reduction was proved by Cohn–Elkies in [**?**]. The second step is to explicitly construct a function in terms of weakly modular forms that possess the desired properties. This second step was Viazovska's contribution and was awarded in 2022 a fields medal.

0.2 Basics of Fourier theory

One of the two main ingredients to the proof of the Viazovska theorem is Fourier analysis. We will start by stating the main definitions and theorems needed for Theorem **??**

Definition 0.1. *Fourier transform*

Theorem 0.2. *Poisson summatation formula.*