INSTITUT DE PHYSIQUE IPHYS

Theory Lunch Seminar

Sphere packings, Fourier interpolation, and modular forms

The sphere packing problem asks for the densest configuration of non-intersecting open unit balls at the Euclidean space. This classical geometric problem is solved only in dimensions 1, 2, 3, 8, and 24. In this talk, we will present a solution of the sphere packing problem in dimensions 8 and 24. It seems that each dimension has its own features and requires a different approach. One method of estimating the density of a sphere packing from above was suggested by H. Cohn and N. Elkies in 2003. Their approach is based on Fourier optimization. Namely, they showed

Prof. Maryna Viazovska

that the existence of a function satisfying certain inequalities for the function itself and for its Fourier transform leads to an upper bound of the density of a sphere packing. Using this method Cohn and Elkies were able to prove almost sharp bounds in dimensions 8 and 24. We will show that functions providing exact bounds can be constructed explicitly. The key ingredient of our construction is the theory of modular forms.

Wednesday March 28ᵗʰ 2018 at 12:30 pm

Auditoire II, room N°234, BSP (Cubotron), EPFL