

Renormalisation at work in mathematics

Abstract:

One can wonder what computing Feynman diagrams has in common with counting integer points on cones. Both issues involve making sense of divergent expressions, whether integrals in the case of Feynman diagrams or discrete sums in the case of cones. A similar difficulty arises on either side, due to the presence of constraints on the integration or summation variables, whether affine on the one side or conical on the other.

We shall explain how the divergences arising in the discrete sums on cones, which are of linear type due to the conical constraints, can be dealt with by means of Birkhoff-Hopf renormalisation methods à la Connes and Kreimer. If time allows, we shall also discuss various renormalisation procedures used to evaluate multiple zeta functions at non positive integers, leading to different tables of values.