



## SÉMINAIRE MATIÈRE CONDENSÉE

**Jeudi** 15 janvier 2026 à **11h**

LPS, bât 510, **Moyen amphi + ZOOM** (en ligne)

**Meeting ID:** 989 1103 5436; **Password:** LPS91405

### Ramanujan, Landau and Casimir, divergent series : A physicist's approach

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It is a popular paradoxical exercise to show that the infinite sum of positive integer numbers is equal to  $-1/12$ , sometimes called the Ramanujan sum. This result is actually well-defined in a proper mathematical sense.

Here we propose a qualitative approach, much like that of a physicist, to show how the value  $-1/12$  can make sense and, in fact, appears in certain physical quantities where this type of summation is involved.

In the light of two physical examples, taken respectively from condensed matter --- the Landau diamagnetism --- and quantum electrodynamics --- the Casimir effect --- that illustrate this strange sum, we present a systematic way to extract the Ramanujan term from the infinity.

In both examples, the "infinite" appears to be a vacuum energy and the Ramanujan sum is revealed by a response function to an external parameter.