

General Mathematics Seminar
of the
University of Luxembourg
in cooperation with the
Luxembourg Mathematical Society

January, 2014

Tuesday, January 21, 2014 at 17.00

Campus Kirchberg, Room B02

Prof. Ozgur Ceyhan
(University of Luxembourg)

From physics to geometry and number theory: Feynman integrals and multiple zeta values

Abstract: Physicists have developed various state of the art techniques to compute the quantities of great physical relevance in particle physics. Mid 90's, it was observed that a central object of number theory, multiple zeta values, persist to appear in Feynman integral computations. A priori there is no reason of such phenomenon. Following this observation, Kontsevich proposed a conceptual explanation based on algebraic geometry, that is, the loci of divergence in these integrals must be very particular type of algebraic geometric objects, mixed Tate motives. In 2000, Belkale and Brosnan disproved this conjecture. Since then, a new research area has develop providing both evidences and counter evidences to Kontsevich's insight.

In this talk, I will describe the current state of this very active research area, a way to correct Kontsevich's proposal and show that the regularized Feynman integrals in position space setting as well as their ambiguities are given in terms of periods of suitable configuration spaces, which are mixed Tate. This talk is based on a joint paper with M. Marcolli.