Du
27
JAN.
2023

15h00
-
16h30

ÉQUATIONS DIFFÉRENTIELLES MOTIVIQUES ET AU–DELÀ

Picard-Fuchs operators for Feynman integrals : algorithm and motives

L'IHP201
201

INSCRIPTION

This talk aims to present two complementary approaches for understanding the Picard--Fuchs operators associated to eynman integrals. 1/ A first approach uses an algorithmic implementation of the Griffiths-Dwork method adapted to singular hypersurfaces. Supplemented by a new factorisation algorithm we obtain a minimal Picard--Fuchs differential operator acting on a given Feynman integral.
2/ A second approach is a study of the geometry and Hodge theory of the hypersurfaces attached to
Feynman integrals for generic physical parameters.
In the case of planar two-loop Feynman graphs, we will explain that the Hodge structure attached to planar two-loop integral decomposes into a mixed Tate piece and variation of Hodge structure from families of hyperelliptic, elliptic curves or
rational curves depending on the space-time dimension. This approach leads to a construction of a construction of the Picard--Fuchs operator that is checked to be compatible with the one obtained from the algorithm. For the non-planar two-loop tardigrade graph we argue that the motive
is of a K3 surface of Picard number 11.

Based on work done with Pierre Lairez, Charles Doran and Andrew Harder

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HORAIRES

L'institut :
• lundi au vendredi de 8h30 à 18h,
• fermé les jours fériés.

Le musée - Maison Poincaré :
• lundi, mardi, jeudi et vendredi
de 9h30 à 17h30,
• samedi de 10h à 18h,
• fermé le mercredi et le dimanche.