Institut Henri Poincaré

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String Theory in Greater Paris

Rencontres Théoriciennes

"Supergravité, théorie des cordes et théorie M"

Jeudi 5 Octobre 2017, 10:00

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CEA Saclay

The sunset in the mirror : a regulator for inequality in the masses

We study the Feynman integral for the sunset graph defined as the scalar two-point self- energy at two-loop order. The Feynman integral is evaluated for all inequal internal masses in two space-time dimensions. Two calculations are given for the Feynman integral ; one based on an interpretation of the integral as an inhomogeneous solution of a classical Picard-Fuchs differential equation, and the other using arithmetic algebraic geometry, motivic cohomology, and Eisenstein series. Both methods use the rather special fact that the Feynman integral is a family of regulator periods associated to a family of elliptic curves. Using an Hodge theoretic (B-model) approach, we show that the integral is given by a sum of elliptic dilogarithms evaluated at the divisors determined by the punctures. Secondly we associate to the sunset elliptic curve a local non-compact Calabi-Yau 3-fold, obtained as a limit of elliptically fibered compact Calabi-Yau 3-folds. By considering the limiting mixed Hodge structure of the Batyrev dual A-model, we arrive at an expression for the sunset Feynman integral in terms of the local Gromov-Witten prepotential of the del Pezzo surface of degree 6. This expression is obtained by proving a strong form of local mirror symmetry which identifies this prepotential with the second regulator period of the motivic cohomology class (Based on work done in collaboration with Spencer Bloch and Matt Kerr.)

Institut Henri Poincaré, salle 314, 3$^{\text{ème}}$ étage

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