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## Jim Bryan : The geometry and arithmetic of banana nano-manifolds.

mardi 13 juin 2023 15:30 (1 heure)

The Hodge numbers of a Calabi-Yau threefold X are determined by the two numbers  $h^{1,1}(X)$  and  $h^{1,2}(X)$  which can be interpreted respectively as the dimensions of the space of Kahler forms and complex deformations respectively. We construct four new examples X\_N, where N \in {5,6,8,9}, of rigid Calabi-Yau threefolds  $(h^{2,1}=0)$  with Picard number 4  $(h^{1,1}=4)$ . These manifolds are of "banana type" and have among the smallest known values for Calabi-Yau Hodge numbers. We (partially) compute the Donaldson-Thomas partition functions of these manifolds and in particular show that the associated genus g Gromov-Witten potential is given by a weight 2g-2 Siegel paramodular form of index N. These manifolds are also modular in the arithmetic sense: there is a weight 4 modular form whose Fourier coefficients are obtained by counting points over finite fields on X\_N. We compute this form and observe that it is the unique cusp form of weight 4 and index N. This is joint work with Stephen Pietromonaco.