



# Analysis, Algebra & Geometry Meetings

DIPARTIMENTO SMFI - UNIVERSITÀ DI PARMA

**29.02.2024**

**16:30**

SALA RIUNIONI - PLESSO DI MATEMATICA

DANIELE ANGELLA (UNIVERSITÀ DI FIRENZE)

CONSTRUCTING AND MACHINE LEARNING CALABI-YAU FIVE-FOLDS

The significance of Calabi-Yau manifolds transcends both Complex Geometry and String Theory. One possible approach to constructing Calabi-Yau manifolds involves intersecting hypersurfaces within the product of projective spaces, defined by polynomials of a specific degree. We show a method to construct all possible complete intersections Calabi-Yau five-folds within a product of four or less complex projective spaces, with up to four constraints. This results in a comprehensive set of 27,068 distinct spaces. For approximately half of these constructions, excluding the product spaces, we can compute the cohomological data, yielding 2,375 distinct Hodge diamonds. We present distributions of the invariants and engage in a comparative analysis with their lower-dimensional counterparts. Supervised machine learning techniques are applied to the cohomological data. The Hodge number  $h^{1,1}$  can be learnt with high efficiency; however, accuracy diminishes for other Hodge numbers due to the extensive ranges of potential values.

The talk is a joint collaboration with Rashid Alawadhi, Andrea Leonardo, and Tancredi Schettini Gherardini.