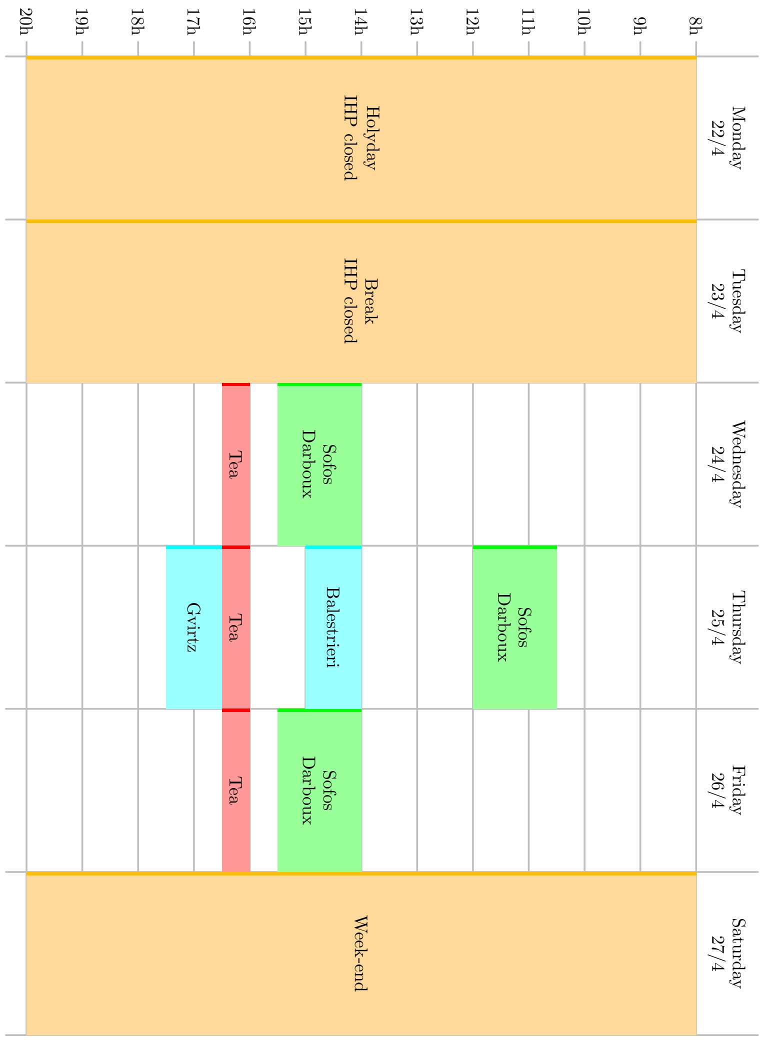
SCHEDULE WEEK 2



Francesca Balestrieri: *Arithmetic of zero-cycles on products of Kummer varieties and K3 surfaces*

The following is joint work with Rachel Newton. In the spirit of work by Yongqi Liang, we relate the arithmetic of rational points to that of zero-cycles for the class of Kummer varieties over number fields. In particular, if X is any Kummer variety over a number field k, we show that if the Brauer-Manin obstruction is the only obstruction to the existence of rational points on X over all finite extensions of

Date: Monday, April 22th–Sunday, April 28th.

k, then the Brauer-Manin obstruction is the only obstruction to the existence of a zero-cycle of any odd degree on X. Building on this result and on some other recent results by Ieronymou, Skorobogatov and Zarhin, we further prove a similar Liang-type result for products of Kummer varieties and K3 surfaces over k.

Damián Gvirtz: *Brauer groups for diagonal surfaces*

In joint work with A. Skorobogatov, we propose a framework to determine the Brauer group of a projective diagonal surface X over a number field k. Our approach utilises results for the complex cohomology of Fermat varieties (Pham, Looijenga) and their associated Galois representations (Weil, Katz, Shioda, Ulmer). For $k = Q$ or $\mathbf{Q}(i)$, we classify the Brauer group for all diagonal quartic surfaces with rational coefficients.

Efthymios Sofos: *Probabilistic Diophantine geometry*

Let F be a smooth homogeneous polynomial with integer coefficients.

In the first part we will see that the prime factorisation of the coordinates of the integer points on $F = 0$ can recognise a part of the geometry of $F = 0$. Namely, we shall model the factorisation by a multivariate Gaussian distribution and we will see that the covariance matrix of the Gaussian distribution (which is a statistical invariant) keeps track of certain geometric data related to the dimensions of hyperplane sections of F.

In the second part we will study the real numbers given by $(\log\log p_i)/(\log\log H)$, where $p_1 < p_2 < \ldots < p_k$ are the primes for which $F = 0$ has no p-adic zeros and H is the size of the coefficients of F. We will see that these numbers are modelled by k uniformly distributed random points in the interval $[0, 1]$, as long as F ranges in an infinite family. This leads to several connections between local solubility for varieties and normal distribution, Brownian motion and Poisson point process.