

Online Number Theory Seminar

17 June 2022. – 17:00-17:50

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A new parametrization for ideal classes in rings cut out by binary forms, and applications

We introduce a new orbit parametrization for square roots of the class of the inverse different in rings cut out by binary forms. We apply the parametrization to bound the average size of the 2-class group in families of number fields defined by binary forms of degree n , where $n \geq 3$ is an arbitrary integer, odd or even. We also apply it to prove that most “superelliptic equations” of the form $z^2 = f(x, y)$, where f is an integral binary form of odd degree, have a Brauer–Manin obstruction to having a primitive integer solution. Moreover, in joint work with Bhargava and Shankar, we use the parametrization to prove that when elliptic curves over \mathbb{Q} are ordered by height, the second moment of the size of the 2-Selmer group is at most 15, confirming a well-known conjecture of Poonen and Rains.