Speaker: David Roberts

Title: Division polynomials with Galois group $U_3(3).2 \cong G_2(2)$

Abstract: The talk will present a comprehensive analysis of a computationally challenging example in constructive Galois theory. Our results in this example indicate what to expect in an infinite hierarchy of similar examples which are currently beyond computational reach.

Our example consists of explicit polynomials $f_1(p, q, x)$ and $f_2(a, b, x)$ describing two related degree twenty-eight covers of the projective plane, each with Galois group $U_3(3).2 \cong G_2(2)$. These polynomials serve simultaneously as 3-division polynomials for curves studied by Deligne-Mostow, 2-division polynomials for other curves studied by Shioda, and 2-division polynomials for motives studied by Dettweiler-Reiter.

The talk will conclude by analyzing specializations of the two covers to carefully chosen curves and points in the base p-q and a-b planes. From this specialization process, we get positive-genus three-point covers of the projective line and low-discriminant number fields, all of which would be difficult to construct directly.

Abstract of the RTG talk: *The RTG talk will introduce several of the concepts used in the main talk, including rigidity and division polynomials. It will illustrate them with an explicit polynomial $f(t, x)$ due to Malle-Matzat, which describes a degree twenty-eight cover of the projective t-line by the projective x-line. This cover also has Galois group $U_3(3).2 \cong G_2(2)$ and it points the way towards the much more complicated covers of the main talk.*