Shiji Lyu Title: Singularities in commutative algebra with a touch of model theory

Shiji Lyu Abstract: In algebraic geometry, the singularities of a variety are usually defined or characterized by its local rings. This gives rise to interesting and important notions and questions in commutative algebra. In this talk, we discuss several results regarding some behaviors of certain notions of singularity, proved with the help of ideas or perspectives from model theory.

Freddy Saia Title: A volcanic approach to CM points on Shimura curves

Freddy Saia Abstract: A CM component of the $\ell$-isogeny graph of elliptic curves has a particular structure, that of an $\ell$-volcano, at least away from certain CM orders. The structure of “isogeny volcanoes” has seen much use in the study of CM elliptic curves over finite fields, originating with 1996 thesis work of Kohel. Recent work of Clark–Saia leverages infinite depth versions of these graphs to study moduli of isogenies of CM elliptic curves over $\mathbb{Q}$. 

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We will discuss an analogue of this work for abelian surfaces with quaternionic multiplication. A main result includes an algorithm to compute the $\mathfrak{o}$-CM locus on the Shimura curve $X_0^o(N)$ over $\mathbb{Q}$, for $\mathfrak{o}$ any imaginary quadratic order and $\gcd(D,N) = 1$. As an application, we give an explicit list of pairs $(D,N)$ for which the Shimura curve $X_0^D(N)$ may fail to have a sporadic CM point.

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