

## Intuition and varieties of nodal and nodal-cuspidal curves

*vendredi 11 octobre 2024 10:00 (1 heure)*

In this talk, we will present and discuss two case studies. The first has to do with nodal curves, and the second with nodal cuspidal curves. During the first decades of the 20th century, Enriques, Severi, and Zariski, among others, researched the variety of nodal curves or of nodal-cuspidal curves. Severi claimed to have proven in 1921 the irreducibility of the moduli space of nodal curves. Zariski relied on this claim in 1929, when proving that the fundamental group of the complement of a nodal curve is abelian. However, it was discovered that Severi's proof contained a gap. Nevertheless, Zariski's theorem was proved correctly by Fulton and Deligne in 1980, and a proof for the irreducibility of the moduli space of nodal curves was given by Harris in 1985. The case for the moduli space of nodal-cuspidal curves is more complicated still. In the framework of his research on surfaces as ramified covers, Enriques conjectured in 1912 that such a variety of nodal-cuspidal curves is smooth (or non-obstructed); Zariski found in 1929 that such a variety can be reducible. But Wahl showed in 1974 that such a variety can be singular; the example of Wahl is based on a pathological curve found by Mumford in his paper "Further Pathologies in Algebraic Geometry" (1962). Mumford's example is one of the examples that Ravi Vakil gave in 2004 regarding the existence of Murphy's law for moduli spaces in algebraic geometry. Concentrating on these two case studies, we analyze various forms of intuition and discuss the different roles it plays. Moreover, we provide a framework to make sense of the social features that affect the epistemic standards governing mathematics and discuss how issues of trust influence both historical and contemporary mathematical practice.

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