

Ecole Graduée 631 MADIS

Sujet de thèse en Mathématique proposé en 2026

Titre : Local tropicalization of complete intersection singularities

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Descriptif : *Local tropicalization* is a local version, adapted to the study of singularities of algebraic, analytic or formal varieties, of the *global tropicalization* of algebraic subvarieties of algebraic tori. The foundations of this theory were established by Dmitry Stepanov and myself in 2013. Its study is developing, as shown by the fact that we received an invitation to write a survey of it in the eighth volume of the *Handbook of Geometry and Topology of Singularities*. This volume was just published by Springer in January 2026. Briefly speaking, local tropicalization measures valuation-theoretically the way the germ approaches the singular point in its ambient space and gives important indications on the toric modifications of the germ.

In a 2024 paper published by Angelica Cueto, Dmitry Stepanov and myself in *Mathematische Annalen* was described the local tropicalization of the important class of isolated complete intersection surface singularities consisting in the so-called *splice type singularities*, introduced in 2005 by Walter Neumann and Jonathan Wahl. In this paper, we pioneered a method of computation of local tropicalizations by successive elimination of convex cones.

The main aim of this thesis project is to extend this method to other classes of complete intersection singularities, possible higher-dimensional, and to develop other methods of computation of local tropicalizations.

In order to start working on this topic it is necessary to have a basic knowledge of complex algebraic geometry, algebraic topology and commutative algebra.