Computing the Newton polytope of a large discriminant
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The Newton polytope of the discriminant of a quaternary cubic form has 166'104 vertices. One way to obtain these vertices is to enumerate all D-equivalence classes of regular triangulations of the 3-dilated tetrahedron. The only known way to do this is to enumerate all regular triangulations of the 3-dilated tetrahedron and group them into classes in a second step.

This talk will focus on the computations carried out to arrive at this result. It involved the use of polymake and mptopcom on large computing clusters in parallel which in turn brought other obstacles. This software can also be used via polymake.jl in OSCAR. Since computer experiments in algebraic geometry are becoming larger and larger, this talks aims at providing insights on how to set up these experiments such that they give reliable results, and how to avoid the pitfalls we encountered.

This is joint work with Robert Loewe.