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3. Number Theory and Arithmetic Algebraic Geometry

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Power integral bases in algebraic number fields

Let K be an algebraic number field of degree n. It is a classical problem in algebraic number theory (dating back to Hasse) to decide if K admits a **power integer basis**, that is an integer basis of the form $\{1, \alpha, \ldots, \alpha^{n-1}\}$. The problem of determining power integral bases can be reduced to the resolution of **index form equations**, which are decomposable form equations of degree $n(n-1)/2$ in $n-1$ variables.
There are already efficient algorithms for solving index form equations in lower degree fields and some recent methods enable one to consider index form equations in some quintic, sextic, and higher degree fields.
The talk gives a survey about the developments in this area.