THE ABEL PRIZE 2026

The Norwegian Academy of Science and Letters awards the Abel Prize 2026 to

Gerd Faltings

of the Max Planck Institute for Mathematics, Bonn, Germany

"for introducing powerful tools in arithmetic geometry and resolving long-standing diophantine conjectures of Mordell and Lang."

Solving polynomial equations over the rational numbers is a longestablished, fundamental part of mathematics. Systems of such equations, which are known as diophantine equations, can be classified initially by the complex dimension of their solution set. The case of dimension zero is already nontrivial and addressed by Galois theory. Dimension one is the case of curves, which are classified topologically by their genus. The genus of a complex curve is the number of holes of the corresponding two-dimensional real Riemann surface. The diophantine problem for curves of genus zero is governed by the Hasse–Minkowski theorem. A curve of genus one gives an elliptic curve. Henri Poincaré (1854–1912) conjectured in 1901 that the group of rational points on an elliptic curve is finitely generated, and this was proved by Louis J. Mordell (1888–1972) in 1922. In the same paper, Mordell conjectured that a curve of genus two or more has only finitely many rational points. This became the central open diophantine problem for the subsequent 60 years until it was proved by Faltings in 1983. As an example, the result of Faltings establishes the finiteness of rational points on all smooth plane curves of degree four or greater, including the famous Fermat curves $x^n + y^n = z^n$ for $n \geq 4$. Faltings's breakthrough proof surprised the experts. Rather than employing diophantine approximation, his approach was via resolving an important case of a conjecture of John Tate (1925–2019) as well as a conjecture of Igor Shafarevich (1923–2017).

In 1989, Paul Vojta found another proof of the Mordell conjecture, following the more traditional lines initiated by André Weil (1906–1998) and Carl Ludwig Siegel (1896–1981). In 1991, Faltings adapted this approach to prove a vast generalization of the Mordell conjecture, namely, the Mordell–Lang conjecture on subvarieties of abelian varieties. An abelian variety, generalizing an elliptic curve, is a complete projective variety having a group structure. Mordell's finite generation result was extended to rational points of abelian varieties by Weil. Here, rational may be taken to be over any fixed number field. The Mordell–Lang conjecture describes the distribution of rational points in any subvariety of an abelian variety. More precisely, it says that all such rational points are contained in the union of finitely many subsets of the given subvariety, each of which is a translate of an abelian subvariety by a rational point.

To prove the Mordell–Lang conjecture, Faltings established a diophantine approximation result known as Faltings's product theorem. This generalizes a key result of Klaus F. Roth (1925–2015) used in the proof of his celebrated theorem on the approximation of algebraic numbers by rational numbers. In 1994, using the product theorem, Faltings and Gisbert Wüstholz gave a new proof of Roth's theorem and its multidimensional generalization known as the Schmidt subspace theorem. In his 1991 paper, Faltings also proved the finiteness of integral points on affine subvarieties of abelian varieties as conjectured by Serge Lang (1927–2005). Faltings's work still stands as the central pillar in modern diophantine geometry.

Classical Hodge theory relates the topology of complex manifolds to their differential geometry. In a similar spirit, *p*-adic Hodge theory studies the natural structures carried by the cohomology of algebraic varieties over *p*-adic fields, where Galois and Frobenius actions encode arithmetic and geometric information, respectively. Faltings made major contributions to *p*-adic Hodge theory, giving proofs of the main conjectures formulated by Tate and JeanMarc Fontaine (1944–2019), and extending its scope to the nonabelian setting under the name of *p*-adic Simpson correspondence. The conjectures of Tate and Fontaine relate *p*-adic étale cohomology (which plays the role played by Betti cohomology in the classical theory) and de Rham cohomology; the non-abelian version relates *p*-adic representations of the fundamental group and Higgs bundles. Tools introduced by Faltings have proved crucial to subsequent developments in *p*-adic Hodge theory and commutative algebra. These include the purity theorem and his notion of almost étale extensions (clarified through the work of Ofer Gabber and Lorenzo Ramero, and subsequently strengthened by Peter Scholze).

Elliptic curves over the complex numbers are parameterized up to isomorphism by points of the modular curve. The modular curve arises as the quotient of the upper-half plane by the group of twobytwo integral matrices of determinant one, acting by linear fractional transformations. Abelian varieties are similarly parameterized by the points of Siegel modular varieties. Faltings, in a 1990 monograph with ChingLi Chai, constructed an arithmetic compactification of these varieties. Their work became a cornerstone for subsequent developments in the theory of integral models and compactifications of Shimura varieties.

Gerd Faltings is a towering figure in arithmetic geometry. His ideas and results have reshaped the field, settling major longstanding conjectures, while also establishing new frameworks that have guided decades of subsequent work. His exceptional achievements unite geometric and arithmetic perspectives and exemplify the power of deep structural insight.