Courses of the PhD School in Mathematics

Academic Year 2025–2026

Title of course: ADVANCES IN GEOMETRY: Abelian Coverings of Algebraic Varieties.

Lecturer: Federico Fallucca

Period: November 2025 - February 2026 or January 2026 - April 2026

Venue: Department of Mathematics, University of Trento

Course: PhD School in Mathematics

Indicative number of academic hours: 30

Scientific Sector: 01/MATH-02 Algebra e Geometria

Examiner: Federico Fallucca

Assessment method: Seminar presentation

Contents: The theory of abelian covers of algebraic varieties has been extensively studied in the literature, mainly with the aim of constructing new significant examples useful for investigating open problems in Algebraic Geometry. We introduce the theory using the framework developed by Pardini in her seminal paper. The first part of the course is devoted to providing simple examples of abelian covers and to defining the so-called building data of a cover. We then state and prove Pardini's Existence Theorem: the sets of building data completely determine the cover. This allows us to translate geometric properties of the cover into properties involving the building data, and vice versa. The second part of the course focuses on expressing significant geometric properties - such as the invariants of the cover and smoothness - in terms of the building data. Finally, we discuss the types of singularities of abelian covers and examine how they arise from the configuration of the components in the branch locus of the cover.