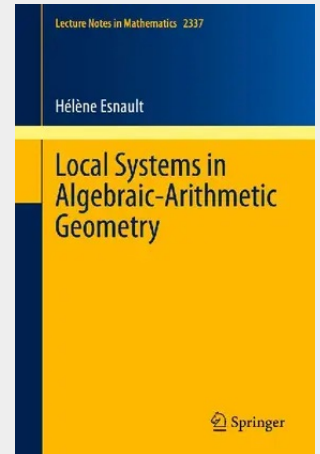


Local Systems in Algebraic-Arithmetic Geometry

The topological fundamental group of a smooth complex algebraic variety is poorly understood. One way to approach it is to consider its complex linear representations modulo conjugation, that is, its complex local systems. A fundamental problem is then to single out the complex points of such moduli spaces which correspond to geometric systems, and more generally to identify geometric subloci of the moduli space of local systems with special arithmetic properties. Deep conjectures have been made in relation to these problems. This book studies some consequences of these conjectures, notably density, integrality and crystallinity properties of some special loci.

This monograph provides a unique compelling and concise overview of an active area of research and is useful to students looking to get into this area. It is of interest to a wide range of researchers and is a useful reference for newcomers and experts alike.

- 1. Lecture 1: General Introduction. - 2. Lecture 2: Kronecker's Rationality Criteria and Grothendieck's p -Curvature Conjecture. - 3. Lecture 3: Mal'cev-Grothendieck's Theorem, Its Variants in Characteristic $p > 0$, Gieseker's Conjecture, de Jong's Conjecture, and the One to Come. - 4. Lecture 4: Interlude on Some Similarity Between the Fundamental Groups in Characteristic 0 and $p > 0$. - 5. Lecture 5: Interlude on Some Difference Between the Fundamental Groups in Characteristic 0 and $p > 0$. - 6. Lecture 6: Density of Special Loci. - 7. Lecture 7: Companions, Integrality of Cohomologically Rigid Local Systems and of the Betti Moduli Space. - 8. Lecture 8: Rigid Local Systems and F -Isocrystals. - 9. Lecture 9: Rigid Local Systems, Fontaine-Laffaille Modules and Crystalline Local Systems. - 10. Lecture 10: Comments and Questions.



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