1. Record Nr. UNINA9910739443103321

Autore	Bismut Jean-Michel
Titolo	Hypoelliptic Laplacian and Bott-Chern cohomology : a theorem of Riemann-Roch-Grothendieck in complex geometry / / Jean-Michel Bismut
Pubbl/distr/stampa	Basel, : Springer, 2013
ISBN	3-319-00128-0
Edizione	[1st ed. 2013.]
Descrizione fisica	1 online resource (210 p.)
Collana	Progress in mathematics ; ; 305
Disciplina	514.23
Soggetti	Cohomology operations Geometry, Algebraic
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Introduction -- 1 The Riemannian adiabatic limit -- 2 The holomorphic adiabatic limit -- 3 The elliptic superconnections -- 4 The elliptic superconnection forms -- 5 The elliptic superconnections forms -- 6 The hypoelliptic superconnections -- 7 The hypoelliptic superconnection forms -- 8 The hypoelliptic superconnection forms of vector bundles -- 9 The hypoelliptic superconnection forms -- 10 The exotic superconnection forms of a vector bundle -- 11 Exotic superconnections and Riemann–Roch–Grothendieck -- Bibliography -- Subject Index -- Index of Notation. .
Sommario/riassunto	The book provides the proof of a complex geometric version of a well-known result in algebraic geometry: the theorem of Riemann–Roch–Grothendieck for proper submersions. It gives an equality of cohomology classes in Bott–Chern cohomology, which is a refinement for complex manifolds of de Rham cohomology. When the manifolds are Kähler, our main result is known. A proof can be given using the elliptic Hodge theory of the fibres, its deformation via Quillen's superconnections, and a version in families of the 'fantastic cancellations' of McKean–Singer in local index theory. In the general case, this approach breaks down because the cancellations do not occur any more. One tool used in the book is a deformation of the Hodge theory of the fibres to a hypoelliptic Hodge theory, in such a way that the relevant cohomological information is preserved, and 'fantastic

cancellations' do occur for the deformation. The deformed hypoelliptic Laplacian acts on the total space of the relative tangent bundle of the fibres. While the original hypoelliptic Laplacian discovered by the author can be described in terms of the harmonic oscillator along the tangent bundle and of the geodesic flow, here, the harmonic oscillator has to be replaced by a quartic oscillator. Another idea developed in the book is that while classical elliptic Hodge theory is based on the Hermitian product on forms, the hypoelliptic theory involves a Hermitian pairing which is a mild modification of intersection pairing. Probabilistic considerations play an important role, either as a motivation of some constructions, or in the proofs themselves.