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	Titolo	Quantum Riemannian Geometry [[electronic resource] /] / by Edwin J. Beggs, Shahn Majid
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	Descrizione fisica	1 online resource (XVI, 809 p. 124 illus., 8 illus. in color.)
	Collana	Grundlehren der mathematischen Wissenschaften, A Series of Comprehensive Studies in Mathematics, , 0072-7830 ; ; 355
	Disciplina	516.373
	Soggetti	Mathematical physics Gravitation Differential geometry Associative rings Rings (Algebra) Group theory Mathematical Physics Classical and Quantum Gravitation, Relativity Theory Differential Geometry Associative Rings and Algebras Group Theory and Generalizations
	Lingua di pubblicazione	Inglese
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	Livello bibliografico	Monografia
	Nota di bibliografia	Includes bibliographical references and index.
	Nota di contenuto	Differentials On An Algebra -- Hopf Algebras and Their Bicovariant Calculi -- Vector Bundles and Connections -- Curvature, Cohomology and Sheaves -- Quantum Principal Bundles and Framings -- Vector Fields and Differential Operators -- Quantum Complex Structures -- Quantum Riemannian Structures -- Quantum Spacetime -- Solutions -- References -- Index.
	Sommario/riassunto	This book provides a comprehensive account of a modern generalisation of differential geometry in which coordinates need not commute. This requires a reinvention of differential geometry that refers only to the coordinate algebra, now possibly noncommutative, rather than to actual points. Such a theory is needed for the geometry

of Hopf algebras or quantum groups, which provide key examples, as well as in physics to model quantum gravity effects in the form of quantum spacetime. The mathematical formalism can be applied to any algebra and includes graph geometry and a Lie theory of finite groups. Even the algebra of 2 x 2 matrices turns out to admit a rich moduli of quantum Riemannian geometries. The approach taken is a `bottom up' one in which the different layers of geometry are built up in succession, starting from differential forms and proceeding up to the notion of a quantum `Levi-Civita' bimodule connection, geometric Laplacians and, in some cases, Dirac operators.The book also covers elements of Connes' approach to the subject coming from cyclic cohomology and spectral triples. Other topics include various other cohomology theories, holomorphic structures and noncommutative D-modules. A unique feature of the book is its constructive approach and its wealth of examples drawn from a large body of literature in mathematical physics, now put on a firm algebraic footing. Including exercises with solutions, it can be used as a textbook for advanced courses as well as a reference for researchers.