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| Sommario/riassunto | This monograph describes some of the most interesting results obtained by the mathematicians and physicists collaborating in the CRC 647 "Space - Time - Matter", in the years 2005 - 2016. The work presented concerns the mathematical and physical foundations of string and quantum field theory as well as cosmology. Important topics are the spaces and metrics modelling the geometry of matter, and the evolution of these geometries. The partial differential equations governing such structures and their singularities, special solutions and stability properties are discussed in detail. Contents Introduction Algebraic K-theory, assembly maps, controlled algebra, and trace methods Lorentzian manifolds with special holonomy - Constructions and global properties Contributions to the spectral geometry of locally homogeneous spaces On conformally covariant differential operators and spectral theory of the holographic Laplacian Moduli and deformations Vector bundles in algebraic geometry and mathematical physics Dyson-Schwinger equations: Fix-point equations for quantum fields Hidden structure in the form factors of $N = 4$ SYM On regulating the AdS superstring Constraints on CFT observables from the bootstrap program Simplifying amplitudes in Maxwell-Einstein and Yang-Mills-Einstein supergravities Yangian symmetry in maximally supersymmetric Yang-Mills theory Wave and Dirac equations on manifolds Geometric analysis on singular spaces Singularities and long-time behavior in nonlinear evolution equations and general relativity |