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Nota di contenuto	Part I: Introduction and Motivation -- It is all About Gravity -- Part II: Geometrical Aspects of Gravitational Action -- Setting the Stage: Review of Previous Results -- Alternative Geometrical Variables in Lanczos-Lovelock Gravity -- Part III: Thermodynamics, Gravity and Null Surfaces -- Thermodynamic Interpretation of Geometrical Variables -- Spacetime Evolution and Equipartition in Lanczos-Lovelock Gravity -- Lanczos-Lovelock Gravity from a Thermodynamic Perspective -- Null Surface Geometry and Associated Thermodynamics -- Entropy of a Generic Null Surface from its Associated Virasoro Algebra -- Part IV: Classical Gravity, Quantum Matter -- A Quantum Peek Inside the Black Hole Event Horizon -- Information Retrieval from Black Holes -- Dynamic Realization of the Unruh Effect for a Geodesic Observer -- Part V: Zero Point Length-Towards Quantum Gravity -- Spacetime with Zero Point Length is Two-Dimensional at the Planck Scale -- Part VI: Summary and Outlook -- Summary and Outlook.
Sommario/riassunto	This thesis explores the connection between gravity and thermodynamics and provides a unification scheme that opens up new directions of exploration. Further elaborating on the Hawking effect and the possibility of singularity avoidance, the author not only

discusses the information loss paradox at a broader level but also provides a possible solution to it. As the final frontier, it describes some novel effects arising from the microscopic structure of spacetime. Taken as a whole, the thesis addresses three major research areas in gravitational physics: it starts with classical gravity, proceeds to the black hole information loss paradox, and closes with Planck scale physics. The thesis is written in a lucid and pedagogical style, with an introduction accessible to researchers from other branches of physics and a discuss ion presenting open questions and future directions, which will benefit and hopefully inspire next-generation researchers.