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Sommario/riassunto	In this thesis, the author considers quantum gravity to investigate the mysterious origin of our universe and its mechanisms. He and his collaborators have greatly improved the analyticity of two models: causal dynamical triangulations (CDT) and n-DBI gravity, with the space-time foliation which is one common factor shared by these two separate models. In the first part, the analytic method of coupling matters to CDT in 2-dimensional toy models is proposed to uncover the underlying mechanisms of the universe and to remove ambiguities remaining in CDT. As a result, the wave function of the 2-dimensional universe where matters are coupled is derived. The behavior of the wave function reveals that the Hausdorff dimension can be changed when the matter is non-unitary. In the second part, the n-DBI gravity model is considered. The author mainly investigates two effects driven by the space-time foliation: the appearance of a new conserved charge in black holes and an extra scalar mode of the graviton. The former implies a breakdown of the black-hole uniqueness theorem while the

latter does not show any pathological behavior.
