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Titolo	Modified Gravity and Cosmology : An Update by the CANTATA Network / / edited by Emmanuel N. Saridakis, Ruth Lazkoz, Vincenzo Salzano, Paulo Vargas Moniz, Salvatore Capozziello, Jose Beltrán Jiménez, Mariafelicia De Laurentis, Gonzalo J. Olmo
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Nota di contenuto	Introduction -- General Relativity -- Foundations of gravity – modications and extensions -- Part I: Theories of Gravity -- Introduction -- A avour on f(R) theories: theory and observations -- Horndeski/Galileon theories -- Massive Gravity and Bimetric Gravity -- Gravity in extra dimensions -- Non-local models -- Metric-Ane gravity -- Geometric Foundations of Gravity -- Palatini theories of gravity -- Hybrid metric-Palatini gravity and cosmology -- Teleparallel and f(T) Gravity: Foundations and Cosmology -- Finsler gravity -- Gravity's Rainbow -- Quantum Cosmology in modied theories of gravity -- Part II: Testing Relativistic Eects -- Introduction -- Laboratory Constraints -- Screening mechanisms -- Microscopic eects of modied gravity -- Compact stars as tests of modied gravity -- Compact objects in General Relativity and beyond --

Parametrized post-Newtonian formalism -- Gravitational Waves -- Gravitational lensing -- Classicalizing gravity -- Part III: Cosmology and Observational Discriminators -- Introduction -- Phenomenological tests of gravity on cosmological scales -- Relativistic eects -- Cosmological constraints from the eective eld theory of dark energy -- The H0 tensions to discriminate among concurring models -- 8 tension. Is gravity getting weaker at low z? Observational evidence and theoretical implications -- Testing gravity with standard sirens: challenges and opportunities -- Testing the dark universe with cosmic shear -- Galaxy clusters and modied gravity -- Probing screening modied gravity with non-linear structure formation -- Conclusions -- Outlook -- The end of the beginning.

Sommario/riassunto

With a focus on modified gravity this book presents a review of the recent developments in the fields of gravity and cosmology, presenting the state of the art, high-lighting the open problems, and outlining the directions of future research. General Relativity and the CDM framework are currently the standard lore and constitute the concordance paradigm of cosmology. Nevertheless, long-standing open theoretical issues, as well as possible new observational ones arising from the explosive development of cosmology in the last two decades, offer the motivation and lead a large amount of research to be devoted in constructing various extensions and modifications. In this review all extended theories and scenarios are first examined under the light of theoretical consistency, and are then applied in various geometrical backgrounds, such as the cosmological and the spherical symmetric ones. Their predictions at both the background and perturbation levels, and concerning cosmology at early, intermediate and late times, are then confronted with the huge amount of observational data that astrophysics and cosmology has been able to offer in the last two decades. Theories, scenarios and models that successfully and efficiently pass the above steps are classified as viable and are candidates for the description of Nature, allowing readers to get a clear overview of the state of the art and where the field of modified gravity is likely to go. This work was performed in the framework of the COST European Action “Cosmology and Astrophysics Network for Theoretical Advances and Training Actions” - CANTATA.