



# **Exact Solutions and Scalar Fields in Gravity: Recent Developments**

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Divided into four parts, this book covers recent developments in topics pertaining to gravity theories, including discussions on the presence of scalar fields.

Part One is devoted to exact solutions in general relativity, and is mainly concerned with the results of rotating null dust beams and fluids. Also included is a panoramic vision of new research directions in this area, which would require revising certain theorems and their possible extensions within gravity theories, new aspects concerning the Ernst potentials, double Kerr spacetimes, and rotating configurations. In particular, there is a detailed discussion of totally symmetric and totally geodesic spaces, in which a method for generating (2+1)-dimensional solutions from (3+1)-dimensional solutions is given.

Part Two deals with alternative theories of gravity, all of which include scalar fields and gauge fields. Here, quantum and cosmological effects, which arise from both gravity theories in four and higher dimensions and from metric-affine theories, are investigated.

Part Three is devoted to cosmological and inflationary scenarios. Local effects, such as the influence of scalar fields in protogalactic interactions, numerical studies of the collapse of molecular cores, as well as the inverse inflationary problem and the blue eigenvalue spectrum of it, are considered. Moreover, the role of scalar fields as dark matter and quantum cosmology in the Bergman-Wagoner and Gowdy theories, together with the relation of the conformal symmetry and deflationary gas universe, are likewise presented. The last part of the book includes some mixed topics which are still in the experimental stage. Among them are the foundation of the Maxwell theory, a discussion on electromagnetic Thirring problems, a note on the staticity of black holes with non-minimally coupled scalar fields, and a study of the Lorentz force free

Thus, this book is the most up-to-date, comprehensive collection of papers on the subject of exact solutions and scalar fields in gravity and is a valuable tool for researchers in the area.



charged fluids in general relativity.

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