

PROGRESS AND PROBLEMS
IN QUANTUM GRAVITY

W. Kummer

Institute f. Theor. Physics,
Vienna University of Technology
(*Wiedner Hauptstraße 8-10, A-1040 Vienna, Austria*)

S u m m a r y

From the point of view of an uncompromising field theorist, quantum gravity is beset with serious technical and, above all, conceptual problems with regard especially for the meaning of genuine “physical” observables. This situation is not really improved by the appearance of recent attempts to reformulate gravity within some novel framework. However, the original aim, a background-independent quantum theory of gravity can be achieved in a particular area, namely 2D dilaton quantum gravity without any assumptions beyond standard quantum field theory. Some important further by-products of the research of the “Kummer’s Vienna School” include the introduction of the concept of Poisson-Sigma models, a verification of the “virtual Black Hole” and the extensions to $N = (1, 1)$ and $N = (2, 2)$ 2D-supergravity, for which complete solutions of some old problems have been possible which are relevant for superstring theory.