Título: Modern Differential Geometry In Gauge Theories. Maxwell Fields, Volume I

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Differential geometry, in the classical sense, is developed through the theory of smooth manifolds. Modern differential geometry from the author's perspective is used in this work to describe physical theories of a geometric character without using any notion of calculus (smoothness). Instead, an axiomatic treatment of differential geometry is presented via sheaf theory (geometry) and sheaf cohomology (analysis). Using vector sheaves, in place of bundles, based on arbitrary topological spaces, this unique approach in general furthers new perspectives and calculations that generate unexpected potential applications.

Modern Differential Geometry in Gauge Theories is a two-volume research monograph that systematically applies a sheaf-theoretic approach to such physical theories as gauge theory. Beginning with Volume 1, the focus is on Maxwell fields. All the basic concepts of this mathematical approach are formulated and used thereafter to describe elementary particles, electromagnetism, and geometric prequantization. Maxwell fields are fully examined and classified in the language of sheaf theory and sheaf cohomology. Continuing in Volume 2, this sheaf-theoretic approach is applied to Yang-Mills fields in general.

The text contains a wealth of detailed and rigorous computations and will appeal to mathematicians and physicists, along with advanced undergraduate and graduate students, interested in applications of differential geometry to physical theories such as general relativity, elementary particle physics and quantum gravity.