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Título: Parabolic Geometries I. Background And General Theory

Autor: Cap Andreas/ Slovak Jan

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Parabolic geometries encompass a very diverse class of geometric structures, including such important examples as conformal, projective, and almost quaternionic structures, hypersurface type CR-structures and various types of generic distributions. The characteristic feature of parabolic geometries is an equivalent description by a Cartan geometry modeled on a generalized flag manifold (the quotient of a semisimple Lie group by a parabolic subgroup).

Background on differential geometry, with a view towards Cartan connections, and on semisimple Lie algebras and their representations, which play a crucial role in the theory, is collected in two introductory chapters. The main part discusses the equivalence between Cartan connections and underlying structures, including a complete proof of Kostant's version of the Bott-Borel-Weil theorem, which is used as an important tool. For many examples, the complete description of the geometry and its basic invariants is worked out in detail. The constructions of correspondence spaces and twistor spaces and analogs of the Fefferman construction are presented both in general and in several examples. The last chapter studies Weyl structures, which provide classes of distinguished connections as well as an equivalent description of the Cartan connection in terms of data associated to the underlying geometry. Several applications are discussed throughout the text.