Survey On The Existence Of Neutral Metrics On Four Manifolds And Spinor Approach To Neutral Geometry

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The existence condition for a neutral metric on a compact 4-manifold was settled (1991) on the basis of significant theorems by Steenrod (1951), Wu (1952), Hirzebruch and Hopf (1958), Atiyah (1970) and Donaldson (1983). The existence condition depends deeply on the topology of the 4-manifold, and may be expressed in terms of the Euler characteristic and the Hirzebruch index of the 4-manifold. I will give a brief survey of the history of this existence theorem. I shall also give a brief introduction of the spinor approach to neutral geometry in four dimensions, based on an ongoing collaboration with Peter R. Law.