Spinors in geometry and gauge theory

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Spinors were first used in mathematical physics by Pauli and Dirac around 1927. Even though mathematicians knew about spinors, their application in geometry was not so well ventured. Then again physics came crashing into our world. In the fall of 1994, Edward Witten announced a "new gauge theory of 4-manifolds" (using spin$^\mathrm{C}$ structures on manifolds), capable of giving results analogous to the earlier theory of Donaldson, but where the computations involved were "at least a thousand times easier" (Taubes). This new theory completely revolutionized the study of 4-manifolds and found its applications in other lower dimensions like 2 and 3. Spinors also found its use in studies of manifolds with exceptional holonomy like G_2. If time permits, I will explain a bit about new gauge theoretic equations found and our work in progress.