Classification of maximally supersymmetric supergravity backgrounds

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Abstract

In the talk from last semester we introduced the field equations of a 11-dimensional supergravity background (M, g, F), where (M, g) is a connected Lorentzian manifold and F is a closed 4-form, called the flux of the background.
Furthermore we defined a connection $D = \nabla^S + \Omega(F)$ on the real spinor bundle S over M, where ∇^S is the spin connection and $\Omega(F)$ is a differential form induced from the flux. A spinor $\varphi \in \Gamma(S)$ is called Killing spinor, if $D\varphi = 0$. The fraction $\frac{dim(\{\text{Killing spinors}\})}{rank(S)} = \frac{dim(\{\text{Killing spinors}\})}{32}$ is called the supersymmetric fraction.
In this talk we will analyze the case, where this fraction is 1, hence all spinors are Killing spinors. The spaces that admit 32 linearly independent Killing spinors are fully classified, a problem which appears to be extremely difficult for other supersymmetry fractions.
We will compute the curvature of a supergravity background and give the conditions, that arise from the fract that it must vanish on a maximally supersymmetric background. Furthermore we will analyze the special structure of the flux and lastly deduce all possible solution of spaces, that satisfy those conditions.