New complete non-compact Spin(7) manifolds

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Analogously to the work of Foscolo, Haskins, and Nordström in the G2 case, I developed a method to construct new complete non-compact Spin(7) manifolds as total spaces of torus bundles on asymptotically conical Calabi-Yau 3-folds. Spin(7) here means with holonomy strictly equal to Spin(7). The torus bundles are required to satisfy a necessary topological condition. In this construction, I make use of the implicit function theorem to solve a system of PDEs which is equivalent to the holonomy being contained in the group Spin(7). I also explain how to make use of my proof to give a more concise proof in the G2 case. Finally, I explain how to use this construction to build an infinite family of complete non-compact Spin(7) manifolds and to produce the first example of a toric complete non-compact Spin(7) manifold in the sense of Madsen-Swann.