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How to uplift three-dimensional maximal supergravities

The inverse problem of Scherk-Schwarz compactification of M-theory consists in distinguishing which lower dimensional maximal (gauged) supergravities admit a higher dimensional uplift, assuming the Scherk-Schwarz compactification to be the unique way to get back the initial theory. A general procedure is known in solving the uplift problem, for dimensions higher or equal to four, based on the generalised geometry formalism. The possibility of finding an uplift results in a condition the embedding tensor, which completely characterises the gauged supergravity, has to fulfill.
We will focus on the three-dimensional case. The main problem is that the fundamental representation of $E_{8(8)}$, the duality group of 3d maximal supergravities, is larger than the number of M-theory degrees of freedom, even including the dual graviton. To overcome the problem, one has to modify the generalised geometry, by "doubling" the generalised Lie derivative. We will show how to extend the known procedure of finding an uplift in this modified generalised geometry, proving that also in this case a constraint has to be fulfilled by the embedding tensor in order an uplift to exist. We will also discuss the global patching of gauge parameters in this setup. [Based on 2409.xxxxx w/ G. Inverso]

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