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*Higher gauge theory, division algebras and superstrings*

Abstract

Classically, superstrings make sense when spacetime has dimension 3, 4, 6, or 10. It is no coincidence that these numbers are two more than 1, 2, 4, and 8, which are the dimensions of the normed division algebras: the real numbers, complex numbers, quaternions and octonions. We sketch an explanation of this already known fact and its relation to “higher gauge theory”. Just as gauge theory describes the parallel transport of supersymmetric particles using Lie supergroups, higher gauge theory describes the parallel transport of superstrings using “Lie 2-supergroups”. Recently John Huerta has shown that we can use normed division algebras to construct a Lie 2-supergroup extending the Poincaré supergroup when spacetime has dimension 3, 4, 6 and 10.