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Sujet de mémoire

## $\mathcal{N} = 2$ Supergravity and Cartan geometry

The extended supergravity theories are models that unify fundamental interactions and are obtained as low-energy limits of superstring theories. The simplest one,  $\mathcal{N}_4 = 2$  supergravity in four spacetime dimensions, realises the unification of Einstein's theory of gravity with Maxwell's theory of electromagnetism. The first goal of this project is to get acquainted with this theory. Although the extended supergravity theory models have been known for quite some time, they have not been described in a genuinely geometric way, contrary to Einstein's gravity that was shown to be best described in terms of a Cartan geometry for the Lorentz group as structure group. The second goal of this master thesis will be to review the Cartan formulation of Einstein's gravity and then to try and generalise it to  $\mathcal{N} = 2$  supergravity in four spacetime dimensions.

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## References

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- [2] Richard W. Sharpe, "Differential geometry : Cartan's generalization of Klein's Erlangen program", Springer, New York (2000), 426 pp.