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N=2 vacua in electrically gauged N=4 supergravities

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We study N=2 vacua in gauged N=4 supergravity theories in four-dimensional spacetime. Using the embedding tensor formalism that describes general consistent magnetic gaugings of an ungauged N=4 matter-coupled supergravity theory in a symplectic frame with SO(1,1) x SO(6,n) off-shell symmetry we formulate necessary conditions for partial supersymmetry breaking and find that the Killing spinor equations can be solved for the embedding tensor components. Subsequently, we show that the classification of theories that allow for vacua with partial supersymmetry amounts to solving a system of purely algebraic quadratic equations. Then, we restrict ourselves to the class of purely electric gaugings and explicitly construct a class of consistent super-Higgs mechanisms and study its properties. In particular, we find that the spectrum fills complete N=2 supermultiplets that are either massless or BPS. Furthermore, we demonstrate that (modulo an abelian Lie algebra) arbitrary unbroken gauge Lie algebras can be realized provided that the number of N=4 vector multiplets is sufficiently large. Finally, we compute the relevant terms of the effective action below the scale of partial supersymmetry breaking and argue that the special Kaehler manifold for the scalars of the N=2 vector multiplets has to be in the unique series of special Kaehler product manifolds. This talk is based on work done in collaboration with Jan Louis and Paul Smyth (JHEP 1303 (2013) 144).

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