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Nonlinear N=2 Supersymmetry and D2-brane Effective Actions

Dp-branes acquire effective nonlinear descriptions whose bosonic parts are related to the Born-Infeld action. This nonlinearity has been proven to be a consequence of the partial $calN = 2 \to calN = 1$ supersymmetry breaking, originating from the solitonic nature of the branes. In this work, we focus on the effective descriptions of D2-branes, which play important roles in the Type IIA string theory. Using the Goldstone multiplet interpretation of the action, we construct a 3D superspace description which makes the first supersymmetry manifest and realizes the second, spontaneously broken, supersymmetry nonlinearly. We find that the role of the 3D Goldstone multiplet can be played by the vector or tensor multiplet which are related under a duality transformation.

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