Gava, E.; Hammou, A. B.; Morales, J. F.; Narain, K. S.  
D1/D5 systems in N=4 string theories. (English) [Zbl 0969.81607]  

Summary: We propose CFT descriptions of the D1/D5 system in a class of freely acting $\mathbb{Z}_2$ orbifolds/orientifolds of type IIB theory, with sixteen unbroken supercharges. The CFTs describing D1/D5 systems involve $\mathbb{N}=(4, 4)$ or $\mathbb{N}=(4, 0)$ sigma models on $(\mathbb{R}^3 \times \mathbb{S}^1 \times \mathbb{T}^4)^N/\mathbb{S}_N \times \mathbb{Z}_2^N$. The resulting multiplicities for two-charge bound states are shown to agree with the predictions of U-duality. We raise a puzzle concerning the multiplicities of three-charge systems, which is generically present in all vacuum configurations with sixteen unbroken supercharges studied so far, including the more familiar type IIB on K3 case: the constraints put on BPS counting formulae by U-duality are apparently in contradiction with any CFT interpretation. We argue that the presence of RR backgrounds appearing in the symmetric product CFT may provide a resolution of this puzzle. Finally, we show that the whole tower of D-instanton corrections to certain “BPS saturated couplings” in the low energy effective actions match with the corresponding one-loop threshold corrections on the dual fundamental string side.

MSC:

81T30 String and superstring theories; other extended objects (e.g., branes) in quantum field theory

Keywords:
conformal field theory; freely acting $\mathbb{Z}_2$ orbifolds; sigma model

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