



DESY THEORY WORKSHOP
24 - 27 September 2013
**Nonperturbative QFT:
Methods and Applications**
DESY Hamburg, Germany



Contribution ID: 93

Type: **not specified**

Nekrasov backgrounds from $N=2$ string amplitudes

I will present a new class of $N=2$ amplitudes in string theory, generalizing the well-known F-terms which compute the topological string theory partition function. These generalized F-terms involve, in addition to the standard anti-self-dual graviphoton background, additional insertions of self-dual vertices. The latter can be identified, using the non-trivial constraint that the correct $N = 2$ gauge theory partition function be recovered in the field theory limit, both perturbative and non-perturbatively. The structure of the amplitudes opens up the possibility of expressing them as correlators in a topological string theory, hence leading to a worldsheet definition of the refined topological string.

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Track Classification: Strings & Mathematical Physics