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Refined BPS invariants on del Pezzo and half K3 Calabi-Yau manifolds

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The most detailed information about rigid $\mathcal{N} = 2$ supersymmetric theories in $\mathbb{R}^4 \times S^1$ is contained in a supersymmetric index counting refined BPS states. They fall into representations of $\mathrm{SU}(2)_L \times \mathrm{SU}(2)_R$, the little group in $5d$, which has an induced action on the cohomology of the moduli space of stable pairs.

I will present the computation of refined BPS state multiplicities associated to M-theory reductions on local Calabi Yau manifolds, which are given by the total space of the canonical bundle over del Pezzo surfaces. The identification of the integer cohomology lattice with the root lattice of exceptional Lie groups plays a key role in this discussion.

The results provide not only a better understanding of Seiberg Witten theory with matter but have also interesting implications for the stable degeneration limit of F-theory compactifications and zero-sized instantons in heterotic string theory.

This talk is based on

M.~X.~Huang, A.~Klemm, M.~Poretschkin “Refined BPS invariants on del Pezzo and half K3 Calabi Yau manifolds” - to appear soon.

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