



# GEOMETRY, TOPOLOGY, AND PHYSICS SEMINAR

## Supersymmetric Gauge Theory and Mock Theta Functions

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Room 6635 South Hall

**Abstract:** The moduli spaces of vacua for the topological  $\mathcal{N} = 2$  supersymmetric gauge theories with gauge group  $SU(2)$  or  $SO(3)$  on  $\mathbb{C}P^2$  with massless hypermultiplets are Jacobian rational elliptic surfaces over  $\mathbb{C}P^1$ . The  $u$ -plane integrals for these moduli spaces compute interesting topological invariants. To evaluate the integrals one needs to integrate by parts using nonholomorphic modular forms or Mock theta functions. We explain what these Mock theta functions are for the  $\mathcal{N} = 2$  gauge theory with gauge group  $SU(2)$  or  $SO(3)$  and how their modular properties relate to the BPS spectrum. Time permitting, I will also sketch how - in the case of the  $SO(3)$ -gauge theory on  $\mathbb{C}P^2$  - one can prove using Mock theta functions that the invariants from the  $u$ -plane integral are in fact the Donaldson invariants.