

Center for Neutrino Physics

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Instanton Counting in Large-N Gauge Theories

Wednesday, September 7, 2:30 p.m.

304 Robeson Hall

We study supersymmetric gauge theories with eight supercharges with large number of colors. We show that the instanton counting initially proposed by Nekrasov has a different realization in term of the effective large-N theory. This observation suggests a network of dualities between gauge theories, topological strings and integrable systems. As a part of a bigger picture we explore the correspondence between three branches of mathematics and physics: geometric representation theory, integrable systems and supersymmetric gauge theories and string/M theory. In the example which I will illustrate we find intricate connections between representations of algebras (like double affine Hecke algebra, Ding Iohara algebra), quantization of integrable many-body systems (like Calogero-Moser, Ruijsenaars-Schneider, spin chains) and instanton (vortex) counting of supersymmetric gauge theories of Seiberg-Witten type. Our results give rise to some new mathematical conjectures.