Tuesday June 13

10:30 - 12:30

Speaker: Omar Kidwai

Title: Topological recursion, WKB analysis, and (uncoupled) BPS structures

Abstract: Starting from the datum of a quadratic differential on a Riemann surface, Gaiotto-Moore-Neitzke studied certain four-dimensional N=2 QFTs by counting its trajectories; the output can be packaged into data known as a BPS structure, which also describes the Donaldson-Thomas theory of CY3 triangulated categories. To solve a totally different problem in physics, Chekhov and Eynard-Orantin introduced the topological recursion, which takes in very similar initial data and recursively produces an infinite tower of geometric invariants, which have been shown to be useful in enumerative geometry.

I will describe recent work connecting these two different theories in the simplest examples. First, I'll present an explicit formula for the topological recursion free energy, and show that it can be written purely in terms of a corresponding BPS structure. This BPS structure is associated a corresponding Riemann-Hilbert-like problem, seeking functions in the $\hbar$ plane with given asymptotics whose jumping is controlled by the BPS (or DT) invariants. I will explain how the topological recursion can be used to produce a "quantum curve", and how applying WKB analysis to this differential operator can be used to solve the Riemann-Hilbert problem.

Based on joint works with K. Iwaki.