Abstract Olivia Dumitrescu

Hitchin theory and quantization of Hitchin Spectral curves

The rainbow is one of the most beautiful phenomena in nature. It has inspired art, mythology, and has been a pleasure and challenge to the mathematical physicists for centuries. You might have wondered what awaited you if you went over the rainbow. Is the world on the other side of the rainbow the same as what we know? Sir George Biddel Airy discovered the rainbow integral and explained the classical analysis of rainbows. 150 years later, Kontsevich found that the same formula determined the multiplication table of cohomology classes on the compactified moduli spaces of Riemann surfaces. This story is one simple example of a mathematical theory of quantum curves. I will briefly introduce Hitchin theory and present the quantization procedure and topological recursion of Eynard - Orantin for arbitrary Hitchin spectral curves.

Interplay between Higgs bundles, quantum curves and opers

I will present a general framework of quantum curves and I will relate it to a conjecture of Davide Gaiotto (2014) giving a particular construction of opers from Higgs bundles in one Hitchin component. The conjecture has been solved by a joint work of Fredrickson, Kydonakis, Mazzeo, Mulase, Neitzke and myself (2016). I will briefly sketch the proof and present a holomorphic description of the limiting oper and explain its geometry (with Motohico Mulase, 2017).