Random Matrix Theory, Determinants and Chiral symmetry

Jac Verbaarschot

SUNY, Stony Brook, US

Abstract

I will give an overview of the application of Random Matrix Theory to QCD both at zero and nonzero chemical potential and discuss its connections with a low-energy effective theory dictated by chiral symmetry. We will mainly focus on QCD Dirac spectra. Universality will be related to the existence of a mass gap. Deviations from Random Matrix Theory will be discussed. One way QCD differs from disordered condensed matter systems is by the presence of a fermion determinant in the partition function. Its importance for the low-energy behavior of the partition function will be discussed. This is most dramatically illustrated by non-Hermitean random matrix theories.