A Random Matrix Study of the QCD Sign Problem[1] JILONG HAN, MIKHAIL STEPHANOV, Department of Physics, University of Illinois, Chicago, USA — We investigate the severity of the sign problem in a random matrix model for QCD at finite temperature T and baryon chemical potential mu. We obtain analytic expression for the average phase factor – the measure of the severity of the sign problem at arbitrary T and mu. We observe that the sign problem becomes less severe as the temperature is increased. We also find the domain where the sign problem is maximal – the average phase factor is zero, which is related to the pion condensation phase in the QCD with finite isospin chemical potential. We find that, in the matrix model we studied, the critical point is located inside the domain of the maximal sign problem, making the point inaccessible to conventional reweighting techniques. We observe and describe the scaling behavior of the size and shape of the pion condensation near the chiral limit.

Jilong Han
Department of Physics, University of Illinois, Chicago, USA

Date submitted: 03 Jun 2008   Electronic form version 1.4