



Department of  
Theoretical Physics

# THE QUANTUM SPACETIME SEMINAR SERIES

## Notes on Melonic $O(N)^{q-1}$ Tensor Models

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**Time:** 11.30 am  
**Venue:** A-304, TIFR



It has recently been demonstrated that the large  $N$  limit of a model of fermions charged under the global/gauge symmetry group  $O(N)^{q-1}$  agrees with the large  $N$  limit of the SYK model. In this talk, we will investigate aspects of the dynamics of the  $O(N)^{q-1}$  theories that differ from their SYK counterparts. We will argue that the spectrum of fluctuations about the finite temperature saddle point in these theories has  $(q-1) (N^2)/2$  new light modes in addition to the light Schwarzian mode that exists even in the SYK model, suggesting that the bulk dual description of theories differ significantly if they both exist. We also study the thermal partition function of a mass deformed version of the SYK model. At large mass we show that the effective entropy of this theory grows with energy like  $E \ln E$  (i.e. faster than Hagedorn) up to energies of order  $N^2$ . The canonical partition function of the model displays a deconfinement or Hawking Page type phase transition at temperatures of order  $1/\ln N$ . We derive these results in the large mass limit but argue that they are qualitatively robust to small corrections in  $J/m$ .