

Bosons and/ or fermions at large charge

Friday, May 24, 2024 2:00 PM (1 hour)

In this talk I will review the general semiclassical method of computation of strongly coupled CFT data for operators of large charge Q , and its application to strongly-coupled bosonic and supersymmetric theories. I will particularly emphasize the use of double-scaling limits to interpolate continuously between field-theoretic weak-coupling perturbation theory and large-charge EFT, when a theory-dependent weak-coupling parameter is available. I will then discuss more recent results applying the same methods to fermionic CFT, including an analysis of a special case (the $O(2N) \times O(2N)$ -symmetric Gross-Neveu model) whose large-charge regime is controlled by Landau Fermi-liquid theory. I will then extend the picture by showing (based on work in progress with Bersini, Orlando and Reffert) that this theory has a third regime at ultra-large charge described by a novel nonabelian superfluid phase. I will explain the transition to this phase via the BCS mechanism which is controlled quantitatively by a second double-scaling limit of Q taken to infinity with $Q \exp\{-N\}$ held fixed.

Presenter: HELLERMAN, Simeon (Tokyo University)