Contribution ID: **44** Type: **Oral**

Phases of scalar and fermionic field theories in thermal Anti-de Sitter Spaces

Abstract: The primary ingredient for studying the phases of a quantum field theory is the effective action, which to the leading order involves computation of one-loop determinants. In this talk which is based on our papers [1] and [2], I will describe a method for computing one-loop partition functions for scalars and fermions on AdS_{d+1} for zero and finite temperature for arbitrary dimensions d that reproduces results known in the literature. The derivation is based on the method of images and uses the generalized eigenfunctions of the Laplacian and Dirac operators on Euclidean AdS which under thermal identification satisfy the desired periodicities. Employing these results, I will then discuss the phases of scalar and fermionic field theories in AdS spaces for $d = 1, 2, 3$ as regions in the corresponding parameter spaces. Along the way, I will also highlight the deviations from the flat space results. We will confirm, for the scalar field theories, that for a finite temperature theory in AdS there occurs a symmetry breaking phase in two dimensions in contrast to flat space where the Coleman-Mermin-Wagner theorem prohibits continuous symmetry breaking. We will also see that unlike flat space, there exists a region in AdS space where both the symmetry breaking and symmetry preserving phases coexist. We will next analyze the phases of the Yukawa theories. For Gross-Neveu models for $d = 1, 2$, in the large N limit we will see that, unlike flat space where the discrete chiral symmetry is restored beyond a certain temperature, the discrete chiral symmetry appearing in the zero fermionic mass limit remains broken at all temperatures in AdS space.

References:

[1] A. Kakkar and S. Sarkar, "On partition functions and phases of scalars in AdS," JHEP 07 (2022), 089 doi:10.1007/JHEP07(2022)089 [arXiv:2201.09043 [hep-th]].

[2] A. Kakkar and S. Sarkar, "Phases of theories with fermions in AdS," JHEP 06 (2023), 009 doi:10.1007/JHEP06(2023)009 [arXiv:2303.02711 [hep-th]].

Email

asthakakkar8@gmail.com

Affiliation

DEPARTMENT OF PHYSICS AND ASTROPHYSICS, UNIVERSITY OF DELHI, DELHI - 110007, INDIA

Authors: Ms KAKKAR, ASTHA (DEPARTMENT OF PHYSICS AND ASTROPHYSICS, UNIVERSITY OF DELHI, DELHI - 110007, INDIA); Prof. SARKAR, SWARNENDU (DEPARTMENT OF PHYSICS, VIDYASAGAR UNIVERSITY, MIDNAPORE - 721102, INDIA)

Presenter: Ms KAKKAR, ASTHA (DEPARTMENT OF PHYSICS AND ASTROPHYSICS, UNIVERSITY OF DELHI, DELHI - 110007, INDIA)

Session Classification: Classical & Quantum Gravity

Track Classification: Classical & Quantum Gravity