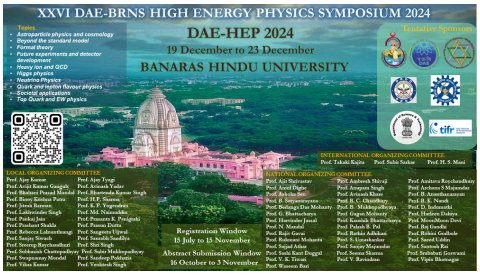


Contribution ID: **103** Type: **Oral**

# Partition Functions and Phases of Quantum Field Theories in AdS Spaces

The effective action, finding which to the leading order involves computation of one-loop determinants, happens to be the primary ingredient for studying the phases of a quantum field theory. In this talk, which is based on our papers [1] and [2], I will describe a method for computing one-loop partition functions for fermions and U(1) vectors on $AdS_{d+1}$ space 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 eigenfunctions of the Dirac and vector Laplacian operators respectively on Euclidean AdS. For finite temperature, partition functions are obtained by generalizing the eigenfunctions so that they obey the desired periodicities (anti-periodicities) for bosons (fermions) under the quotient group action, which defines the thermal AdS spaces. Employing these results, I will then discuss the phases of fermionic field theories in AdS spaces for $d = 1, 2, 3$ and scalar QED in $d = 2, 3$ as regions in the corresponding parameter spaces. Along the way, I will also highlight the deviations from the flat space results.

References:

[1] 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]].
[2] A. Kakkar and S. Sarkar, "Partition functions for U(1) vectors and phases of scalar QED in AdS," JHEP 06 (2024), 095 doi:10.1007/JHEP06(2024)095 [arXiv:2311.06045 [hep-th]].

## Field of contribution

Theory

**Authors:** Dr KAKKAR, ASTHA (Indian Institute of Technology Kanpur, Kanpur - 208016, India); Prof. SARKAR, SWARNENDU (Department of Physics, Vidyasagar University, Midnapore - 721102, India)

**Presenter:** Dr KAKKAR, ASTHA (Indian Institute of Technology Kanpur, Kanpur - 208016, India)

**Track Classification:** Formal theory