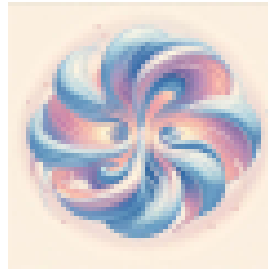


# The 8th International Conference on Chirality, Vorticity and Magnetic Field in Quantum Matter



ID de Contribution: 83

Type: **Flash Talk (Plenary) + Poster**

## Dirac fermions under imaginary rotation

*lundi 22 juillet 2024 17:45 (5 minutes)*

Recent years have seen an increase in the interest to investigate the thermodynamic properties of strongly-interacting systems under rotation. Such studies are usually performed using lattice gauge techniques on the Euclidean manifold and with an imaginary angular velocity,  $\Omega = i\Omega_I$ . When  $\nu = \beta\Omega_I/2\pi$  is a rational number, the thermodynamics of free scalar fields "fractalizes" in the large volume limit, that is, it depends only on the denominator  $q$  of the irreducible fraction  $\nu = p/q$  [1].

The present study considers the same problem for free, massless, fermions at finite temperature  $T = \beta^{-1}$  and chemical potential  $\mu$  and confirms that the thermodynamics fractalizes when  $\mu = 0$ . Curiously, fractalization has no effect on the chemical potential  $\mu$ , which dominates the thermodynamics when  $q$  is large. The fractal behavior is shown analytically for the fermionic condensate, the charge currents and the energy-momentum tensor. For these observables, the limits on the rotation axis are validated by comparison to the results obtained in [2] for the case of real rotation. Enclosing the system in a fictitious cylinder of radius  $R$  and length  $L_z$  allows constructing averaged thermodynamic quantities that satisfy the Euler relation and fractalize.

[1] V. E. Ambruş, M. Chernodub, Phys. Rev. D 108 (2023) 085016.

[2] V. E. Ambruş, J. High Energ. Phys. 2020 (2020) 16.

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