Contribution ID: **7** Type: **not specified**

Vortex solutions of Liouville equation and quasi spherical surfaces

Friday, 18 September 2020 10:15 (15 minutes)

We identify the two-dimensional surfaces corresponding to certain solutions of the Liouville equation of importance for mathematical physics, the non-topological Chern-Simons (or Jackiw-Pi) vortex solutions, characterized by an integer $N \geq 1$. Such surfaces, that we call $S^2(N)$, have positive constant Gaussian curvature, K, but are spheres only when $N = 1$. They have edges, and, for any fixed K, have maximal radius c that we find here to be $c = N/\sqrt{K}$. If such surfaces are constructed in a laboratory by using graphene (or any other Dirac material), our findings could be of interest to realize table-top Dirac massless excitations on non-trivial backgrounds. We also briefly discuss the type of three-dimensional spacetimes obtained as the product $S^2(N) \times \mathbb{R}$.

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Session Classification: Teoretická fyzika

Track Classification: Teoretická fyzika