

Path integration in the field of a topological defect: the case of disclination

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Abstract

A particle bound in the vicinity of the wedge disclination is studied by path integration. The line element in the disclinated medium we consider is

$$ds^2 = dr^2 + \sigma^2 r^2 d\theta^2 + dz^2$$

where σ is a parameter related to the angular deficit. The medium has a flat geometry except for the singular line at $r = 0$. Although the geometric structure appears simple, path integration is not trivial. With the help of the asymptotic recombination trick, the path integral for the system is calculated. A short range repulsion and a long range attraction are included in the path integral in addition to the disclination.