

Homework 4

Geometrical methods in theoretical physics HT-11

1. Can we have a non-trivial line bundle (or S^1 -bundle) over S^3 ? Explain the answer.
2. Take a two sphere S^2 and calculate the following trace over the space of all differential forms $\Omega^\bullet(S^2)$

$$\text{tr}((-1)^F e^{-\beta\Delta}) ,$$

where Δ is Laplace operator on forms.

Do the same for S^3 . Why the answers are different?

[*Hint*: see the lecture notes for the notations]

to be handed in before 5 p.m., January 15, 2012