拓扑相变与拓扑场论作业

DDL:06-16 假设 15 周正常结课放假

1 阅读文献（二选一）：A four-dimension generation of quantum hall effect[1] 或 Dirac's monopole wihtout strings: classical lagrange theory [2]；

2 若 $|\psi_\alpha\rangle = g_{\alpha j}|\psi_j\rangle, A' = g^{-1}Ag + g^{-1}dg, F' = g^{-1}Fg$, 证明：$Q_{2n+1}(A', F') - Q_{2n+1}(A, F) = Q_{2n+1}(g^{-1}dg, 0) + d\alpha_{2n-2}, Q_{2n+1}(g^{-1}dg, 0) = \omega_{2n+1}(g)$NJP,D,065011(2011) eq24,25 [3]；

3 利用 lundell Table 1, steifel manifold, [4] 推导 NJP,12,065010(2010) table3 [3]；

4 推导 SSH model 论文 eq.2.1 - eq.3.19 [5], 可参考 Su-Schrieffer-Heeger model applied to chains of finite length[6]；

5 推导文章 Finite Size Effects on Helical Edge States in a Quantum Spin-Hall System, Zhou Bin, Shunqin Shen. [7]；

6 推导文章公式和结论 Coupled Spin and Valley Physics in Monolayers of MoS2 and Other Group-VI Dichalcogenides_Di Xiao. [8]

7 推导文章 Topological Zero-Energy Modes in Gapless Commensurate Aubry-André-Harper Models, Ganeshan et al. [9]。

References

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[2] Tai Tsun Wu and Chen Ning Yang. "Dirac's monopole without strings: Classical Lagrangian theory". In: *Phys. Rev. D* 14 (2 1976), pp. 437–445. DOI: 10.1103/PhysRevD.14.437. URL: https://link.aps.org/doi/10.1103/PhysRevD.14.437.

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[8] Di Xiao et al. "Coupled Spin and Valley Physics in Monolayers of MoS_2 and Other Group-VI Dichalcogenides". In: *Phys. Rev. Lett.* 108 (19 2012), p. 196802. DOI: 10.1103/PhysRevLett.108.196802. URL: https://link.aps.org/doi/10.1103/PhysRevLett.108.196802.

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