

Massachusetts Institute of Technology  
Department of Physics

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Condensed Matter Theory Seminar

" $Z_N$  Berry phase as a symmetry protected topological index: application to  $SU(N)$  symmetric models"

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**Abstract:** We demonstrate the usage of the  $Z_N$  Berry phase, which is quantized into  $2\pi/N$ , in characterization of symmetry-protected topological phases. To make the Berry phase "topological", exact quantization is important. Taking two correlated bosonic models, one with  $SU(3)$  symmetry and the other with  $SU(4)$  symmetry, as examples, it is shown that (i) the Berry phase should be defined using a local gauge twist on an  $N-1$  dimensional parameter space, and (ii) the integration path in the  $(N-1)$ -dim space should be properly chosen, in order to have exact quantization into  $2\pi/N$ . Interestingly, it is also shown that the topological transition is associated with Dirac cones or nodal lines in the  $(N-1)$ -dim parameter space.

Reference: Toshikaze Kariyado, Takahiro Morimoto, Yasuhiro Hatsugai, arXiv:1709.01546

**12:00PM**  
**Friday, September 29, 2017**  
**Duboc (4-331)**

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Host: Yuki Nagai