

Massachusetts Institute of Technology
Department of Physics

CONDENSED MATTER THEORY SEMINAR

**“From Topological Order to a Lattice non-
Perturbative Definition of
Chiral Fermion/Gauge Theory”**

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Abstract: A non-perturbative definition of anomaly-free chiral fermions and bosons in 1+1D spacetime as finite quantum systems on 1D lattice is proposed. In particular, any 1+1D anomaly-free chiral matter theory can be defined as finite quantum systems on 1D lattice with on-site symmetry, if we include strong interactions between matter fields. Our approach provides another way, apart from Ginsparg-Wilson fermions approach, to avoid fermion-doubling challenge. In general, using the defining connection between gauge anomalies and the symmetry-protected topological orders, we propose that any truly anomaly-free chiral gauge theory can be non-perturbatively defined by putting it on a lattice in the same dimension. As an additional remark, we conjecture/prove the equivalence relation between 't Hooft anomaly matching conditions and the boundary fully gapping rules.

Work based on: arXiv: [1307.7480](https://arxiv.org/abs/1307.7480), [1305.1045](https://arxiv.org/abs/1305.1045), [1303.1803](https://arxiv.org/abs/1303.1803), [1212.4863](https://arxiv.org/abs/1212.4863).

4:00pm
Friday, September 13, 2013
(Duboc Seminar Room)
Room 4-331