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**Many-body topological invariants for symmetry-protected topological phases**

I will introduce a fully many-body formalism that can describe symmetry-protected topological phases (fermionic ones, in particular) even in the presence of strong interactions. Examples include (2+1) dimensional time-reversal symmetric topological insulators, and (1+1) topological superconductors. For topological phases protected by time-reversal, I will demonstrate partial transpose plays a key role in construction of topological invariants.