Abstract Submitted
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**Fractional topological superconductors with fractionalized Majorana fermions** ABOLHASSAN VAEZI, Cornell Univeristy — In Ref[1], I introduced a two dimensional fractional topological superconductor (FTSC) as a strongly correlated topological state which can be achieved by inducing superconductivity into an Abelian fractional quantum Hall (FQH) state, through the proximity effect. When the proximity coupling is weak, the FTSC has the same topological order as its parent state, and thus Abelian. However, upon increasing the proximity coupling, the bulk gap of such an Abelian FTSC closes and reopens resulting in a new topological order: a non-Abelian FTSC. I show that the conformal field theory (CFT) that describes the edge state of non-Abelian FTSC is $U(1)/Z_2$ orbifold theory and use this to write down the ground-state wave-function. Further, I predict FTSC based on Laughlin state at $\nu = 1/m$ filling to host vortices with fractionalized Majorana zero modes. These zero modes are non-Abelian quasi-particles which is evident in their quantum dimension of $d_m = \sqrt{2m}$. Using the multi-quasi-particle wave-function based on the edge CFT, I derive the braid matrix for the zero modes. Finally, the potential applications of the non-Abelian FTSCs in the topological quantum computation will be illustrated. [1] A. Vaezi, ArXiv:1204.6245 (2012)

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