

Abstract: I will introduce the classification of (2+1)D topological phases with symmetries. It is based on the fusion and braiding properties of quasiparticle excitations, or mathematically, unitary braided fusion categories (UBFC). We find that topological phases with symmetry are classified by a sequence of UBFCs, $E \subset C \subset M$, plus a central charge c . They correspond to $\{\text{local excitations}\} \subset \{\text{all excitations}\} = \{\text{local excitations plus topological excitations}\} \subset \{\text{excitations in the gauged theory}\} = \{\text{all excitations plus gauged symmetry defects}\}$, respectively. Local excitations carry representations of the symmetry group G ; they form a symmetric fusion category $E = \text{Rep}(G)$ or $E = \text{sRep}(G^f)$. All excitations form a non-degenerate UBFC C over E and M is a minimal modular extension of C . Based on these results, we are able to produce tables of topological phases and study more structures of them, such as the stacking operation and anyon condensations.