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## Non-invertible Defects from Higher Gauging

I discuss invertible and non-invertible topological condensation defects arising from gauging a discrete higher-form symmetry on a higher codimensional manifold in spacetime, which we define as higher gauging. A  $q$ -form symmetry is called  $p$ -gaugeable if it can be gauged on a codimension- $p$  manifold in spacetime. We focus on 1-gaugeable 1-form symmetries in general  $2+1$ d QFTs, and gauge them on a surface in spacetime. The universal fusion rules of the resulting invertible and non-invertible condensation surfaces are determined. We emphasize that the fusion “coefficients” in these non-invertible fusion rules are generally not numbers, but rather  $1+1$ d TQFTs. In the special case of  $2+1$ d TQFT, every (invertible and noninvertible) 0-form global symmetry, including the  $\mathbb{Z}_2$  electromagnetic symmetry of the  $\mathbb{Z}_2$  gauge theory, is realized from higher gauging. Finally, we discuss examples of non-invertible symmetries in non-topological  $2+1$ d QFTs.