Contribution ID: **8**   Type: **not specified**

Fractional topological charge in lattice Abelian gauge theory

Wednesday, 7 December 2022 15:00 (20 minutes)

Since Gaiotto et.~al discussed the low-energy dynamics of gauge theories on the basis of the mixed 't Hooft anomaly between discrete and higher-form symmetries, this type of application of the anomaly has been studied vigorously. In this study, in order to understand this type of application of the anomaly in a completely regularized framework, we formulate the fractional topological charge associated with the $U(1)/\mathbb{Z}_q$ principal bundle in the compact $U(1)$ lattice gauge theory by generalizing L\"uscher's construction. This fractional topological charge in lattice gauge theory is $\mathbb{Z}_q$ one-form gauge invariant and odd under the lattice time reversal transformation. By employing these properties of the fractional topological charge, we can show that the $U(1)$ gauge theory containing matter fields with charge $q \in 2\mathbb{Z}$ has the mixed 't Hooft anomaly between the $\mathbb{Z}_q$ one-form symmetry and the time reversal symmetry when $\theta = \pi$. This is analogous to the mixed 't Hooft anomaly between the $\mathbb{Z}_N$ one-form symmetry and the time reversal symmetry in $SU(N)/\mathbb{Z}_N$ theory when $\theta = \pi$.

Primary author: Mr ABE, Motokazu (Kyushu University)

Presenter: Mr ABE, Motokazu (Kyushu University)

Session Classification: Parallel session B