Symmetry has proven to be of fundamental importance for describing Nature. I will discuss recent developments in various generalizations of global symmetries and their applications in quantum field theory, condensed matter physics, and quantum gravity. These new global symmetries exist ubiquitously in a variety of quantum systems, ranging from the Ising model, to topological phases of anyons and fractons, and even to the Standard Model. These generalized symmetries can have generalized anomalies, which lead to nontrivial dynamical consequences on renormalization group flows. In the case of fractons and related exotic lattice models in condensed matter physics, the generalized global symmetry results in a surprising UV/IR mixing. Finally, a new global symmetry in QCD provides an alternative explanation for the neutral pion decay in the real world.

Host: Ian Moult

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Physics Club is a weekly colloquium of general interest to the Department of Physics, Applied Physics, Astronomy, and Mathematics. The series is aimed at graduate students, postdoctoral researchers, research staff and faculty. The name dates to the late 1890s, the era of J Willard Gibbs, who influenced the intellectual life at Yale through a number of “graduate clubs”. Physics Club is sponsored by the Yale Physics Department and Yale University.