Topology Seminar

Cameron Krulewski

of MIT will be speaking on

Invertible Functorial Field Theory for Symmetry Breaking and Interactions in Quantum Field Theory

on April 28 at 6:00 in
MIT Room 2-131

I will discuss two applications of invertible field theories to quantum field theory. Functorial field theories, which are functors from a bordism category to a target category, are invertible when they factor through the Picard groupoid of the target. After additionally imposing reflection positivity, such theories are classified, due to results of Freed-Hopkins, by Anderson-dual bordism groups.

The first application we study is toward a certain form of spontaneous symmetry breaking. We model three physical processes using a twisted Gysin sequence of Anderson-dual bordism groups. Using generalized Euler classes, we study the Smith maps of Madsen-Tillmann spectra that underlie the sequence, and use them to draw physical predictions. The second application we study is toward fermionic symmetry-protected topological phases (SPTs). Generalizing work of Freed-Hopkins, we define and compute twisted Atiyah-Bott-Shapiro maps from twisted spin bordism to shifts of K-theory in order to compare two models of SPTs. This talk represents several joint projects with Antolín Camarena, Debray, Devalapurkar, Liu, Pacheco-Tallaj, Sheinbaum, Stehouwer, and Thorngren.

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