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Minimally doubled fermions and topology in 2D

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We use the two-dimensional Schwinger model to investigate how lattice fermion operators perceive the global topological charge $q \in \mathbf{Z}$ of the gauge background. After a warm-up part devoted to Wilson and staggered fermions, we consider Karsten-Wilczek and Borici-Creutz fermions, which are in the class of minimally doubled lattice fermion actions. The focus is on the eigenvalue spectrum of the selected operator and on the eigenvalue flow (as a function of the scalar mass m) of its hermitean counterpart. Without modification both minimally doubled operators are found to be insensitive to topology, but in either case it is possible to define a suitable taste term to make the operator topology aware.

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