



HARVARD UNIVERSITY  
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# Mathematical Picture Language Seminar



**Friday, June 5**

**3:00 p.m. Boston time**

**Jefferson 356**

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ETH Zurich

## **An elementary derivation of the periodic table of topological matter**

**Abstract:** Band insulators and superconductors are of topological interest, depending on the dimension of physical space and on their symmetry classes. Within the context of the independent particle approximation, their topological content is summarized by a periodic table (due to Kitaev and precursors) that lists the index groups for each dimension and each of 10 classes. Various derivations of the table have been provided. The talk is about one more, prompted by the striking feature that groups are constant along the diagonals of the table. That observation calls for a corresponding proof, which will be provided by an isomorphism between groups that are diagonal neighbors. The details of the isomorphisms depend on the pair of classes involved. For instance, if the domain of that map relates to a non-chiral class (and hence the target to a chiral class in the next lower dimension), the map itself can be understood quite simply by way of an analogy: A real bundle on a circle can be pictured as a strip, either as a Möbius strip or an ordinary one. The isomorphism is the one mapping the bundle to the clutching map that comes from cutting the circle. (Joint work with F. Santi).

**This talk will be posted two days after the seminar at**  
<https://mathpicture.fas.harvard.edu/seminar> and  
<https://www.youtube.com/@mathematicalpicturelanguag2715/videos>