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**Postion-momentum duality in the entanglement spectrum of free fermions** CHING HUA LEE, XIAO-LIANG QI, Stanford University — The entanglement spectrum (ES) provides a valuable way of studying the topological properties of a system, i.e. those of exotic phases where no usual topological order parameter exists. In this talk, I shall discuss a framework where the partitionings of various spaces, i.e. real, momentum and spin space are treated on equal footing. This relies on an equivalence of the eigenvalue spectra of certain combinations of projection operators. For instance, the ES remains invariant if we mathematically interchange the real-space projector with the occupied band projector. One can go a step further and conclude that exchanging the physical roles of real-space and momentum space projectors lead to two different systems with identical ES. Such reinterpretations allow one to extend well-known results involving real-space cuts in critical systems to those with simultaneous momentum-space cuts. The results for gapped systems are even more interesting, with the real-space ES of a generic band insulator shown to be identical to that of two different layers or spins in a specific fermi liquid state. This framework also allows one to view the Wannier polarization spectrum as the infinite temperature limit of the ES of a certain system originally defined at zero temperature.

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