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**Topological frequency conversion** IVAR MARTIN, Argonne National Laboratory , GIL REFAEL, California Institute of Technology, BERTRAND HALPERIN, Harvard — We study the problem of arbitrarily strong multi-tonal drive applied to non-linear systems. The dynamics has a natural representation in terms of "transport" in a multi-dimensional Floquet space, with an applied "electric" field (whose components are proportional to the drive frequencies). The number of the Floquet space dimensions equals the number of *irrationally* related drive frequencies. In particular, for two-tone drive, when the band structure in the 2D Floquet space is topologically non-trivial (has non-zero Chern number, $C$), we find that there is a topological pumping of energy between the frequencies $\omega_1$ and $\omega_2$, with the rate $P_{12} = -P_{21} = (C/2\pi)\hbar\omega_1\omega_2$. This pumping is the analog of the transverse response in a conventional topological insulator.

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