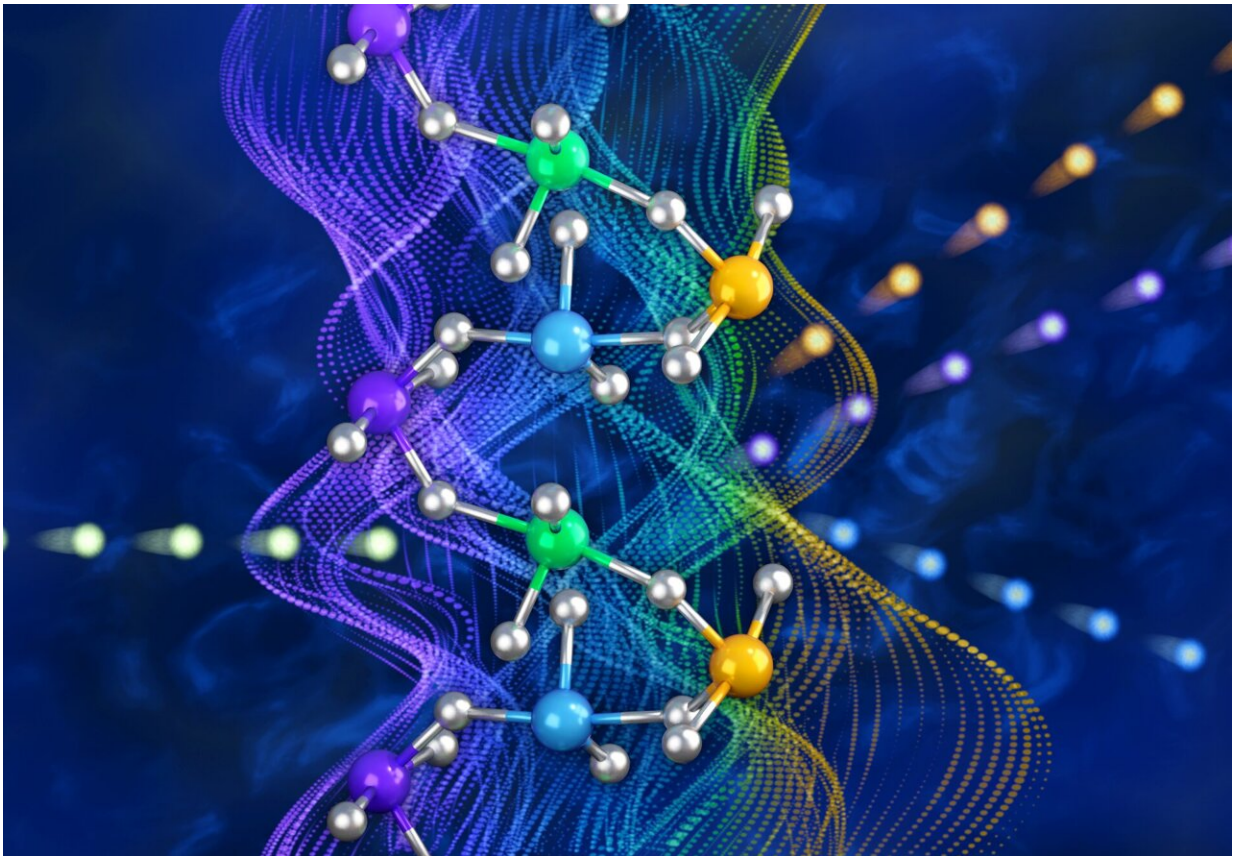


Atoms vibrating in a twisted crystal spin waves that carry heat

December 1 2021, by Dawn M Levy



ORNL researchers observed that atomic vibrations in a twisted crystal result in winding energetic waves that govern heat transport, a discovery that may help new materials better manage heat. Credit: Jill Hemman/ORNL, U.S. Dept. of Energy

A discovery by Oak Ridge National Laboratory researchers may aid the design of materials that better manage heat. The team observed that atoms vibrating in a twisted crystal drive winding energetic waves that carry heat, like a corkscrew drives a cork from a bottle.

"The structural helix puts a spin on the waves," said ORNL's Raphael Hermann. He and his colleagues used neutron scattering to observe wave behavior inside a twisted crystal. Then, ORNL's Lucas Lindsay wrote rules for the wave behavior—that is, angular momentum conservation—into a model that ORNL's Rinkle Juneja has since applied to more than a dozen materials.

"New understanding of twisted systems helps us determine how [heat](#) moves in them," Lindsay said. "Using this knowledge, we are now searching for materials that better carry heat away in microelectronics or block heat, like in a thermos, to keep your coffee hot or your beer cold."

More information: R. Juneja et al, Quasiparticle twist dynamics in non-symmorphic materials, *Materials Today Physics* (2021). [DOI: 10.1016/j.mtphys.2021.100548](https://doi.org/10.1016/j.mtphys.2021.100548)

Provided by Oak Ridge National Laboratory

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