The strange behavior of sound through solids
12 September 2022

Two sound waves (1 and 2) are produced, scattering into two other sound waves (3 and 4), which are then detected. The probability for this process is described by a 4-point scattering amplitude. Credit: Angelo Esposito

Not everything needs to be seen to be believed; certain things are more readily heard, like a train approaching its station. In a recent paper, published in Physical Review Letters, researchers have put their ears to the rail, discovering a new property of scattering amplitudes based on their study of sound waves through solid matter.

Feynman diagrams have long been an indispensable tool of particle physicists, yet they come with certain limitations. For example, high accuracy calculations can require tens-of-
thousands of Feynman diagrams to be entered into a computer, to describe particle interactions. By gaining a better understanding of scattering amplitudes, researchers may be able to more easily pinpoint particle behavior rather than relying on the top-down approach of Feynman diagrams, thus enhancing the efficiency of calculations.

"The present work reveals a twist in the story, showing that condensed matter physics displays much richer phenomenology of scattering amplitudes than what was previously seen in fundamental, relativistic physics," added Esposito. "The discovery of fractional-power scaling invites further work on scattering amplitudes of collective oscillations of matter, placing solids in the focus."


Provided by Institute for Advanced Study

*This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.*