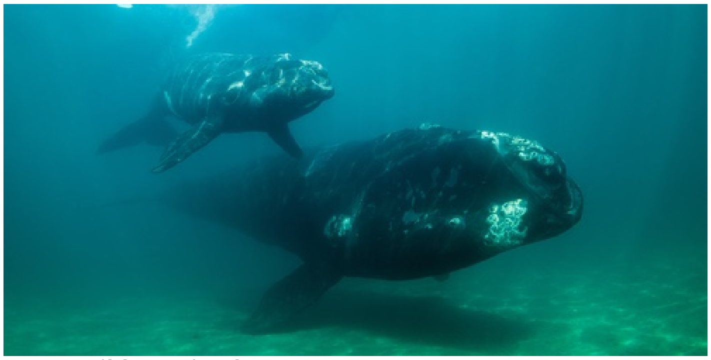
# Whale Calls Reveal an Unexpected Wave Effect

**A theory inspired by whale tracking suggests that interference could make the peak of a light-wave packet appear to travel faster than light—without transmitting information superluminally.**

By Ryan Wilkinson

Whales are routinely located by analyzing the times when their calls reach underwater microphones. While studying the accuracy of this approach, John Spiesberger at the University of Pennsylvania and Eugene Terray at the Woods Hole Oceanographic Institution in Massachusetts identified an intriguing theoretical wave-interference effect [1]. This effect can make the peak of a sound or light-wave packet appear to reach a receiver at a supersonic or superluminal speed, respectively. If verified experimentally, the phenomenon would need to be carefully accounted for when inferring the positions of wave sources from signal arrival times.

Spiesberger and Terray found that the sound energy of a whale's call can be supersonic when the whale is near both the sea surface and the microphones used for localization. This effect occurs because the microphones receive not only a direct sound wave but also a surface-reflected echo. Interference between these two waves can advance the arrival time of the combined signal instead of merely altering its strength. Such advancement had not previously been recognized in underwater acoustics.



Credit: wildestanimal/stock.adobe.com

Given that all waves share similar physics, an analogous effect should exist where light energy reaches a detector at superluminal speeds. This effect would be distinct from other mechanisms that can produce a similar result, such as anomalous dispersion and quantum tunneling. According to relativity theory, it is impossible to transmit information faster than light. Spiesberger and Terray proved that their effect is fully consistent with this theory: The time needed to determine if the energy has arrived ensures that no information can be transferred at superluminal speeds.

**Correction (19 August 2026):** The original wording could have been understood as describing the superluminal transport of energy. It has been revised to refer instead to the apparent motion of a wave-packet peak.

Ryan Wilkinson is a Corresponding Editor for *Physics Magazine* based in Durham, UK.

## REFERENCES

1. J. L. Spiesberger and E. Terray, "Supersonic and superluminal energy and speed of information via temporal interference in a dispersionless environment," Phys. Rev. E 114, 025107 (2026).