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Scattering of co-current surface waves on an analogue black hole

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In Poitiers has been realized a stationary transcritical flow of water in a flume that possesses the analogue of a black hole horizon for long-wavelength surface waves. The horizon has been probed via the scattering of an incident co-current wave, which partially scatters into counter-current waves on either side of the horizon, yielding three outgoing waves (of which one has negative energy) rather than two in the absence of transcriticality. The measured scattering coefficients are in good agreement with the prediction of the non-dispersive theory, where the kinematical description in terms of an effective spacetime metric is exact. The data is also used to construct the two-point correlation function of free surface deformations, where the emergence of characteristic peaks is observed.

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