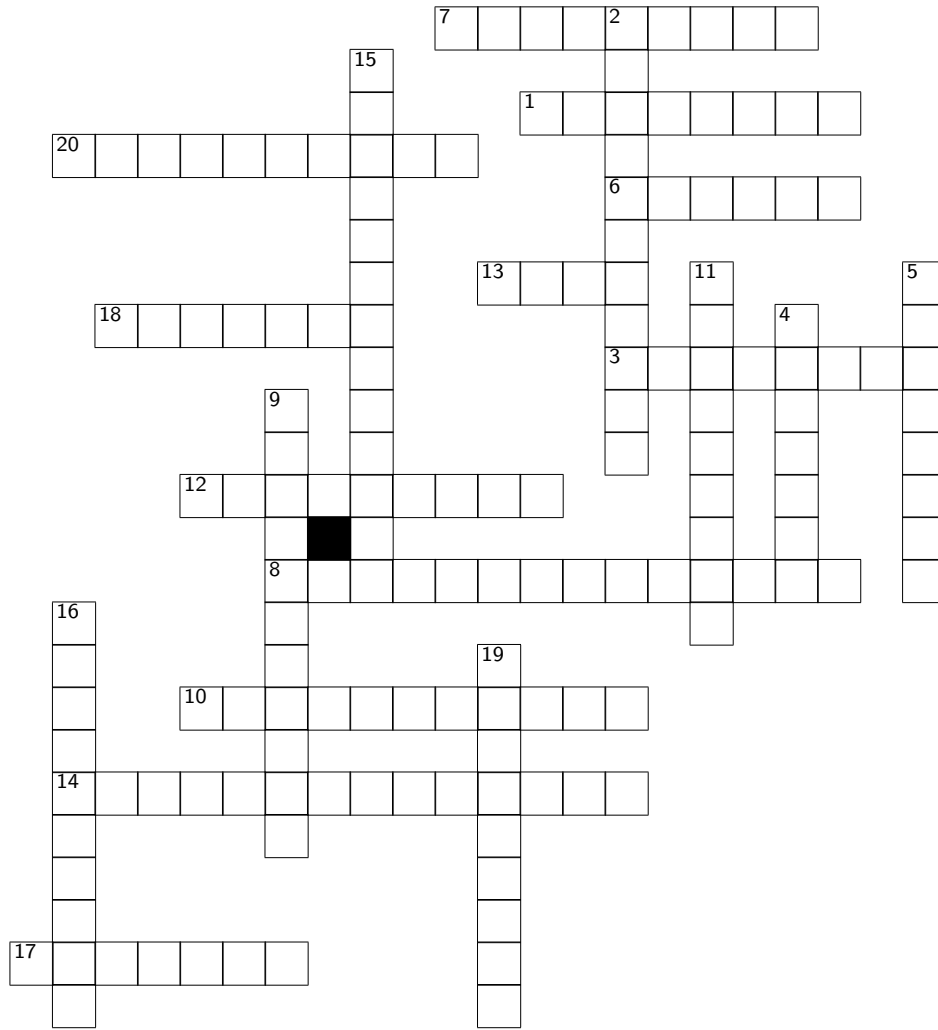


# Scattering and diffraction of acoustic waves in three problems with broken symmetry



## Across

- 1 “the existence of different viewpoints from which the system appears the same”
- 3 uniformity of a system in different directions
- 6 Soviet physicist who calculated acoustic radiation force on subwavelength spheres
- 7 German physicist after whom the operator  $\nabla^2 + k^2$  is named, where  $k$  is the wavenumber
- 8 The density of an \_\_\_\_\_ medium does not vary time, precluding the existence of acoustic waves.
- 10 At high frequencies, wavefronts are \_\_\_\_\_, meaning they resemble plane waves.
- 12 This is the order of the wave variable at which radiation force is studied.
- 13 German-British physicist after whom the weak-scattering approximation is named; Oppenheimer’s advisor
- 14 Acoustic \_\_\_\_\_ is denoted by the Greek letter  $\alpha$  and describes a scatterer at low frequencies.
- 17 A \_\_\_\_\_ medium does not supply external acoustic or electromagnetic energy.
- 18 The \_\_\_\_\_ number  $\ell$ , sometimes referred to as the topological charge, describes the helicity of a vortex beam.
- 20 American physicist associated with the far-field surface integral for radiation force

## Down

- 2 uniformity of a system at different positions
- 4 French physicist who studied the diffraction of light from circular apertures
- 5 British physicist who explained why the sky is blue
- 9 The \_\_\_\_\_ approximation, also called the low-frequency approximation, assumes that the acoustic wavelength is much larger than the length scale of interest.
- 11 \_\_\_\_\_ acoustics is an infinite-frequency approximation in which sound waves are modeled as rays.
- 15 \_\_\_\_\_ crystals generate an electric field when squeezed.
- 16 In a \_\_\_\_\_ medium, changing the position of the source and observer has no effect on the measured fields.
- 19 The symbol  $\nabla_{\perp}^2$  is the transverse \_\_\_\_\_, given in Cartesian coordinates by  $\partial^2/\partial x^2 + \partial^2/\partial y^2$ .