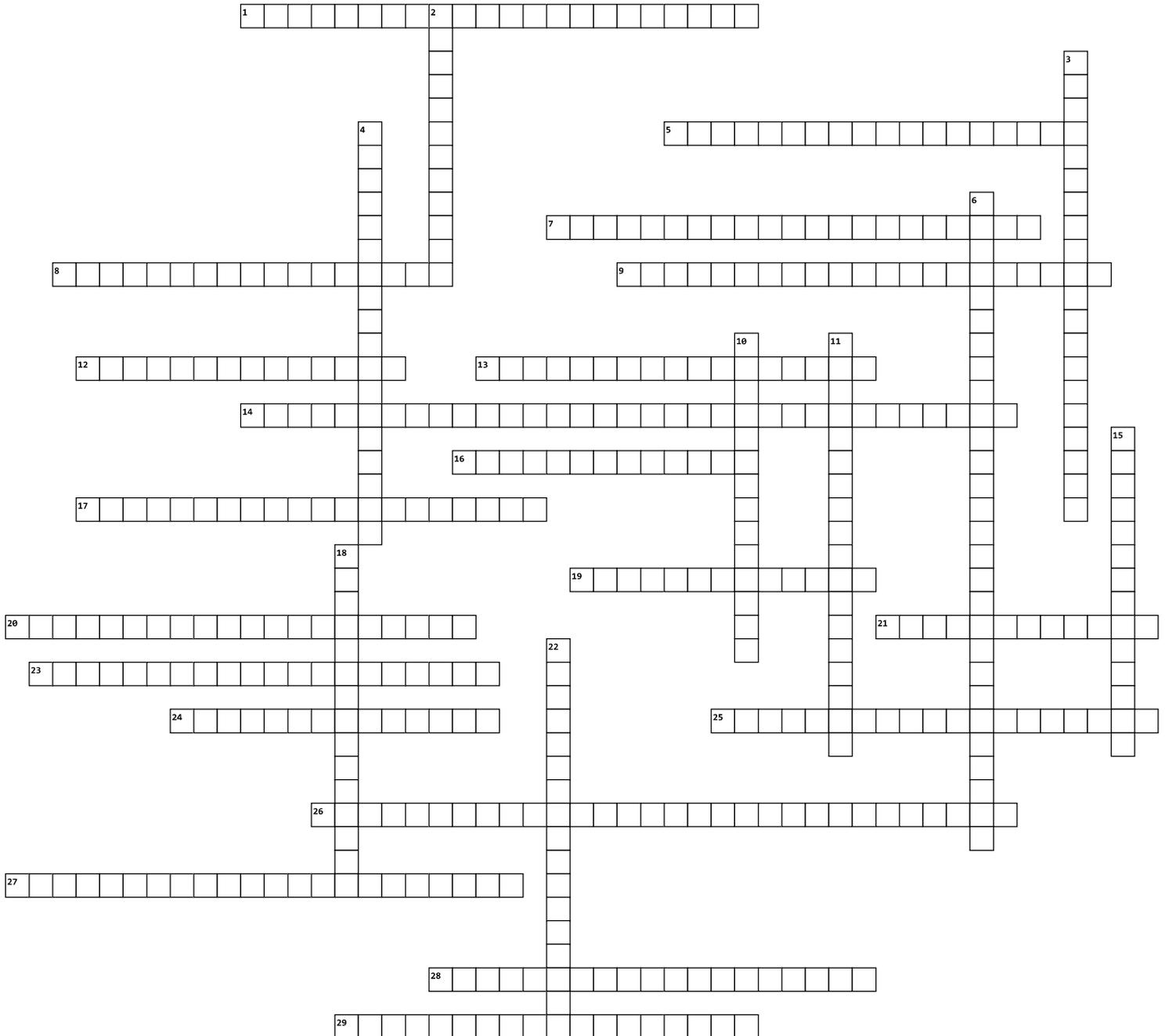


Dual nature of electron



Across

1. Emission of electrons when a material is illuminated by light of sufficient energy.
5. Maximum photocurrent observed when all photoelectrons are collected at the anode.
7. Concept that particles such as electrons and photons exhibit both wave-like and particle-like properties.
8. Branch of physics that describes the behavior of particles at atomic and subatomic levels.

Down

2. Streams of electrons observed in vacuum tubes, discovered by J.J. Thomson.
3. Phenomenon where electrons are emitted from a material when it is exposed to light of sufficient frequency.
4. Minimum negative potential required to stop the most energetic photoelectrons from reaching the anode.

- 9.** Wavelength associated with a particle of matter, given by $\lambda = h/p$, where h is Planck's constant and p is momentum.
- 12.** Emission of electrons from a metal surface due to the application of a strong electric field.
- 13.** Fundamental constant relating energy and frequency of radiation, approximately (6.63×10^{-34}) Js.
- 14.** Mathematical relation explaining photoelectric emission, given by $(K_{\max} = h\nu - \phi_0)$, where $(h\nu)$ is the energy of the incident photon.
- 16.** Energy of a photon given by $(E = h\nu)$, where ν is the frequency of the radiation.
- 17.** Smallest packet of energy associated with electromagnetic radiation, synonymous with photon.
- 19.** Minimum energy required for an electron to escape from a metal surface, measured in electron volts (eV).
- 20.** Wave consisting of oscillating electric and magnetic fields, traveling at the speed of light.
- 21.** Waves associated with particles of matter, proposed by de Broglie.
- 23.** Electric potential difference between two points, measured in volts.
- 24.** Field surrounding a charged particle, exerting force on other charged particles.
- 25.** Minimum frequency of incident radiation required to cause photoelectric emission from a material.
- 26.** Experiment that confirmed the wave nature of electrons by observing electron diffraction.
- 27.** Emission of electrons from a material when illuminated with light of a certain frequency.
- 28.** Emission of electrons from a heated metal surface.
- 29.** The highest level of current reached when all photoelectrons emitted are collected.
- 6.** Experiment performed to measure the charge of the electron.
- 10.** Smallest possible discrete unit of energy.
- 11.** Measure of the power per unit area of the incident light on a surface.
- 15.** Phenomenon in which X-rays scattered by electrons exhibit a shift in wavelength, confirming the particle nature of photons.
- 18.** Ratio of the electric charge to the mass of a particle, used to characterize electrons.
- 22.** Release of electrons from a material's surface due to thermal, electrical, or light energy.