Quantum mechanics is the branch of physics relating to the very small. It results in what may appear to be some very strange conclusions about the physical world. At the scale of atoms and electrons, many of the equations of classical mechanics, which describe how things move at everyday sizes and speeds, cease to be useful. In classical mechanics, objects exist in a specific place at a specific time. However, in quantum mechanics, objects instead exist in a haze of probability; they have a certain chance of being at point A, another chance of being at point B and so on.

Quantum mechanics (QM) developed over many decades, beginning as a set of controversial mathematical explanations of experiments that the math of classical mechanics could not explain. It began at the turn of the 20th century, around the same time that Albert Einstein published his theory of relativity, a separate mathematical revolution in physics that describes the motion of things at high speeds. Unlike relativity, however, the origins of QM cannot be attributed to any one scientist. Rather, multiple scientists contributed to a foundation of three revolutionary principles that gradually gained acceptance and experimental verification between 1900 and 1930.

Quantized properties: Certain properties, such as position, speed and color, can sometimes only occur in specific, set amounts, much like a dial that "clicks" from number to number. This challenged a fundamental assumption of classical mechanics, which said that such properties should exist on a smooth, continuous spectrum. To describe the idea that some properties "clicked" like a dial with specific settings, scientists coined the word "quantized."

Particles of light: Light can sometimes behave as a particle. This was initially met with harsh criticism, as it ran contrary to 200 years of experiments showing that light behaved as a wave; much like ripples on the surface of a calm lake. Light behaves similarly in that it bounces off walls and bends around corners, and that the crests and troughs of the wave can add up or cancel out. Added wave crests result in brighter light, while waves that cancel out produce darkness. A light source can be thought of as a ball on a stick being rhythmically dipped in the center of a lake. The color emitted corresponds to the distance between the crests, which is determined by the speed of the ball's rhythm.

Waves of matter: Matter can also behave as a wave. This ran counter to the roughly 30 years of experiments showing that matter (such as electrons) exists as particles.

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