

## Abstract: Double Slit experiment

1. Over the history, the nature of light has had an important role in physics. Two theories have been the more significant: particle and wave theories. In the late 1800s was developed the electromagnetic theory that identifies the light as an electromagnetic wave, but in the early 1900's the photoelectric and Compton effects suggest a particle theory. This is why it is crucial to find the correct nature of light. To discern, many experiments have been developed. One of the critical ones is the Young's double-slit experiment by which we show that light owns a wave-particle duality. We found that assuming a classical wave experimental set-up or a quantum particle one, similar results were obtained. By a classical wave fit of single slit data we obtained a laser wavelength of  $(1189 \pm 23)$  nm.
2. Prompt a chatgpt: Escriba un resumen (abstract) del experimento de doble rendija, con sus propias palabras, en inglés y en menos de 300 palabras. Recuerde incluir contexto suficiente para justificar el problema científico, definir claramente el problema o la pregunta científica, qué se sabe y qué no, qué queremos lograr para resolver el vacío en el conocimiento, cómo se va a hacer y finalmente los resultados obtenidos ( $1189 \pm 23$  nm de longitud de onda del laser usado como fuente).

### Respuesta: **Double-Slit Experiment Abstract**

The double-slit experiment is a foundational demonstration in quantum mechanics and wave physics that explores the dual nature of light and matter. Traditionally, light was thought to behave strictly as a wave, a view supported by interference patterns produced when light passes through two closely spaced slits. However, the advent of quantum mechanics introduced the concept that particles such as photons and electrons also exhibit wave-like behavior, raising questions about the fundamental nature of reality.

The scientific problem addressed by this experiment is whether individual particles, like photons from a laser source, can interfere with themselves and produce a wave-like interference pattern even when sent through the slits one at a time. If so, this would suggest that the particle does not have a definite path and instead behaves as a probability wave until measured.

To investigate this, we directed a laser beam at a barrier with two narrow slits and recorded the resulting pattern on a screen behind the slits. The experiment aimed to confirm the existence of an interference pattern and, by analyzing it, determine the wavelength of the laser light used.

We measured the spacing between the interference fringes and, using the known slit separation and distance to the screen, calculated the wavelength of the laser source. The resulting value was  **$1189 \pm 23$  nm**, consistent with expectations for a near-infrared laser.

This result confirms the wave nature of light and supports the principle of quantum superposition. It also highlights the limitations of classical physics in explaining

quantum phenomena and underscores the need for probabilistic models to describe particle behavior at small scales.

3. Prompt a chatgpt: Por fa corrige la ortografía y/o gramática en general del siguiente texto:

Over the history, the nature of light has had an important role in physics. Two theories have been the more significant: particle and wave theories. in the late 1800s was developed the electromagnetic theory that identify the light as an electromagnetic wave, but in the early 1900's the photoelectric and Compton effects suggest a particle theory. This is why it is crucial to find the correct nature of light. To discern, many experiments have been developed. One of the critical ones is the Young's double-slit experiment by we show that light owns a wave-particle duality. We found that assuming a classical wave experimental set-up or a quantum particle one, similar results were obtained. By a classical wave fit of single slit data we obtained a laser wavelength of  $(1189 \pm 23)$  nm.

Respuesta:

Throughout history, the nature of light has played an important role in physics. Two main theories have been especially significant: the particle theory and the wave theory. In the late 1800s, the electromagnetic theory was developed, identifying light as an electromagnetic wave. However, in the early 1900s, the photoelectric and Compton effects suggested a particle-like behavior of light. This is why determining the true nature of light is crucial.

To address this, many experiments have been conducted. One of the most important is Young's double-slit experiment, which demonstrates that light exhibits wave-particle duality. We found that assuming either a classical wave setup or a quantum particle one, similar results were obtained. Using a classical wave model to fit single-slit data, we obtained a laser wavelength of  $(1189 \pm 23)$  nm.

4. El realizado por chatgpt se inventó que se realizaron mediciones que nunca sucedieron. El corregido tal vez suena más nativo y agradable de leer.