

Re: High school experiment examining particle–wave duality?

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Coyn wrote:

For a (relatively large) high school project, I would like to examine particle–wave duality. I was wondering what experiments I could do to this effect.

Ideally, I would love to look at the wave nature of the electron. An electron ray shouldn't be too hard to come by (can I effectively get one out of an old CRT monitor?), but is it feasible to send the electron ray through a grating and see interference patterns? I suppose that vacuum is needed for this, as well as something (photographic?) which can detect the trace of the electrons on the other side of the grating. According to de Broigle, the wavelength L of an electron is something like $mc^2=hc/L \Rightarrow L = hc/(mc^2) = h/mc = 2.42 \text{ pm}$. Is it even possible to get a grating fine enough to produce any diffraction? Any tricks that can be used? Or any other experiments you can suggest?

Thanks in advance
Coyn

Electrons are tough, because the wavelengths are typically very short. Light is easier.

Here you can use Young's disk experiment (bright spot in the middle, counter to particle model) for the wave picture, and the photoelectric effect (independence of ejected electron KE from intensity of incident light, and other things) for the particle picture.

PD

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