Re: New look for classic double−slit quantum−interference experiment

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From: Mark Fergerson (*nunya_at_biz.ness*)
Date: 03/09/05

Date: Tue, 08 Mar 2005 18:47:35 −0700

Quantum Mirror wrote:
> Mark Fergerson wrote:
>
>>Quantum Mirror wrote:

<brevity snips>

>>>Someone has misunderstood the details of this and I would like to
>>>see the paper.
>>
>> I'm not sure why you say that, and so would I.

> I say that because I don't believe complementarity can act as a slit!!

I'm not sure anyone says it has done so...

> I am not a big fan of voodoo physics.

Good. Me either.

>>>I think a alternative explanation for this would be the two peaks
>>>produce two electrons which interfere with each other.
>>
>> If two electrons were produced it would be obvious from the
>> ionization state of the remnant atoms (determinable from the recombination glow
>>color, return current from the electron detectors etc). That isn't
>>mentioned.

>>>From a PDF on Paulus's web site:
>
> Figure 2 shows Ar++ ion momentum (Pk) distributions
> along the laser polarization direction for different CE
> phases measured at a fixed laser pulse width (= fs) and
> intensity (Ý0 TW=cm2). The ion momentum resolution
> is 0.1 a.u. The spectra reflect the distributions of the
> corresponding sum−momentum component of the two photoelectrons

Wait, which PDF is that? Does it apply directly to the experiment under question?

>> If the experiment proves to show what they think it does, it puts
>>a neat twist in the old quantum computing game. As I mentioned, we now
>>simultaneously have total and zero "which−way" information about the
>>interfering particles depending on which way you look at it, because
>>this is basically the standard Young's Experiment "done sideways" so
>>to speak.

> What he said was:
> "We have complete which−way information and no which−way information
> at the same time for the same electron,"

Yep.

> One electron?

Yep.

> I have found the paper that is a precursor to this one and the science
> editor at Phisicsweb has it wrong.
>
> http://faculty.physics.tamu.edu/ggp/Publications/041−PaulusAbsPhTheoryPhysScript04.pdf
> If you read on page 123 (excerpt from Phisica Scripta not that many
> pages in this PDF) 4th paragraph on the right column, the explanation
> is completely logical. No cut and paste from the document or I would
> have.

Can you be more specific? It gets rather thick about the point where he mentions that the photoelectrons follow the vector potential rather than the field.

(I am also somewhat unnerved to find that the strong−field laser−atom interaction model has a question mark tagged onto it "since symmetric ionization occurs at the wrong absolute phase".)

Do you mean the part beginning with:

"Evidently, the 'electrons' created at several instants tsub0 within the laser pulse in reality are wave packets which may and, not surprisingly, which do interfere. For long pulses,in every optical cycle identical packets are created."

Yet the experiment under question doesn't use long pulses, but short "few cycle" pulses which presumably create at best two packets. The article seemed to indicate that the two possible packets interfered to produce the actual detected electron.

We really need to see the finished paper.

Mark L. Fergerson