Questions Arising When One Laser beam Crosses Another

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Many youngsters have likely tried to 'cut' or deflect one laser (pointer) beam with another; and noted that they could not detect any effect whatsoever. But what if that type of experiment was performed with very hi-tech, powerful, and sensitive equipment? Like is done with the high energy 'particle smashers – except trying to get photon to side-swipe photon, instead of proton to hit proton? We discuss some very important implications depending on whether a 'photon-against-photon' deflection can be obtained. (If any reader already knows of any 'down-to-earth' experiment settling the issue**;** please provide answer with reference, and spare readers most of my article, below.)

1…Introduction**:**

Like a kid playing with toys**;** I have casually tried crossing one low-power cheap laser (pointer) beam with another similar one. And as inferred by all too few articles**;** I noticed no deflections! With regard to attempting that with professional, sophisticated, high-powered and sensitive equipment**;** I, regretfully, can not tell from ultra technical, short abstracts on the Internet -- if the simple tests I envision have ever been done. In one experiment, researchers claimed that they got some photons to engage other photons to produce electrons and positrons. [**1**]

But after some thought, I have concluded that that result (although commendable and interesting); does **not** definitively address my simple 'defection' question! Neither does, I think, the inference in some literature that the chance of a photon colliding with another is statistically too small to warrant much investigating. [**2**]

2…Discussion, and a 'Thought Experiment' is suggested**:**

2A…I hope that a sensitive professional test, like I outline below, will some day be conducted, and its outcome clearly presented**:** The main laser beam could be aimed, say north to south. And its photons would hit a target to the South, a target that would also have many photon detectors around it. And, say, a dozen, or so, similar laser beams (directing photons somewhat from east to west) would be aimed to cut (intercept) that main laser beam at a few degrees angle or less, across its N-S trajectory. And the attempted intercept would occur fairly close to the main beam's origin compared to its overall travel distance to the target. A platform holding those dozen lasers (which emit their crossing-over beams) could be lowered and raised, very slowly and slightly, to try to insure a successful 'cut', or interception of the main beam.

Many sensors around the target would try to detect some photon deflections, i.e., a detection above the background noise. I am no expert, and the beams might also have to

travel in a near vacuum, and some of the equipment might have to be partly or totally in that vacuum. As I mentioned, one might start by using 'a dozen beams to intersect the main (N-S) beam at a few degrees or less**;** but later other tests could also be attempted at other intersecting angles, i.e., 30 Deg., 90 Deg., etc., and cutting beam half way to target.

2B…It has long been known in Physics that conventionally modeled atoms and particles are considered to collide a little like billiard balls, i.e., neutrons against uranium, or alpha particle against gold foil -- obeying Coulomb's law. And with fairly predictable breakup or deflections occurring. And similarly with regard to Compton scattering, i.e., photons or x-rays against electrons or against other conventional elementary particles.

2C…But in the case of photons heading toward other photons**,** it generally seems to be as if photons are playing a special dodge-game**;** and the energy, momentum, and even the original direction of each photon seems somehow to be preserved after the successful 'dodge'. This reminds us somewhat of some other relatively rare phenomena that occur in physics under special circumstances**:** Superfluidity, superconductivity, and the apparent ability of neutrinos (with spin one-half) to go extremely long distances though high-density large bodies without being stopped or detected. And some of those neutrinos have high 'mass-energy equivalence'. [**3**] And even red sunlight is only slightly deflected by many miles travel through a pretty thick atmosphere of air molecules.

One NPA'er, a knowledgeable scientist from Eastern Europe, once remarked that many of his colleagues regarded space, itself, as a medium with superfluidity (and perhaps he also implied that space might support similar behavior for some entities in that space, under certain conditions).

3…Interpretation of Possible Results (When one Photon Crisscrosses another Photon)**:**

3A…Suppose **Deflection** (of One Beam by the Others) **DOES Occur:** That would seem an expected outcome based on a very simplistic model of one traveling photon or corpuscle side-swiping another simple one. (Or those collisions occurring at, say, a 90 Deg. angle.) If that simple outcome occurs – we note it is already like so many well-known occurrences in Physics. As previously noted, alpha particles or protons knock other particles in one direction -- and are, themselves, deflected in another. And similarly with 'the Compton effect'. Again, that would simply "**end my paper**" now!

3B…But Supposing **Deflection** Does **NOT Occur:** If a deflection does not occur, or it is not observable even with great attempts**;** then we likely need to fundamentally change much of our Physics and how we approach the Universe. That outcome would be somewhat analogous to superconductivity, superfluidity, and the '**no**-effect' outcome in the Michelson Morley experiment (MMX) attempts. And would be somewhat like long red photons during sunset suffering negligible deflection.

It would also seem similar to a wave-like outcome -- where a wiggle near the fixed 'near-end' of a long-stretched spring eventually causes a wiggle near the fixed 'far-end' of the spring. And even though a second perpendicular vibrating spring imposes an additional

'wiggle' on it, the fixed 'far-end' is not allowed to move much, and doesn't. And no iron spring molecule, itself, actually travels from the near end to the far end, nor ends up depositing itself far from the far fixed end.

We also note this: Historically, much 'ado' has been made about the '**null**' outcome in the 'MMX' type experiments, involving one light beam nearly perpendicular to another light beam. (In the course of actions, during these MMX tests**;** the beams are supposed to merge and cause one reinforcing light pattern to transform into an interfering pattern. Except in MMX tests, that change in interference pattern **fails** to occur.

But contemplate the 'ramifications' if we can **not** even get one laser beam (photons) to deflect any photons of another! Isn't that **non-defection** result **far more significant** than any MMX 'non-outcome'? And perhaps that carries implications for the MMX outcomes also? A photon's 'ponderable mass' may be located a considerable distance away from the main 'fields associated with it' (i.e., the 'aether perturbations'). So even when those fields are affecting a target -- that photon's main ponderable mass may not yet have arrived, or may have earlier arrived and disappeared..

((Incidentally, I still believe that a Lorentz-like 'length contraction' likely does occur at high 'absolute' velocities! And that light propagation likely does involve a real ponderable mass 'glob', itself, emanating from, say, a region 'A', and then traveling, say, a long distance away to a region 'B', and depositing its own same material self at that target destination (region 'B'), i.e., likely involves a 'traveling particle' reality.))

A few words about my 'superconductivity' and 'superfluidity' analogies**:** Suppose one had a superconductive metal wire loop with flowing elections, and it was intersected by another identical superconductive loop 'perpendicularly' running into it (across it) in one place. That is somewhat similar to a typical plumber's "Cross fitting". If superconductivity commenced in that second loop also**;** I wonder if flow in each of the two perpendicularly intersecting loops could continue indefinitely, say, as each ones' electron flow 'dodged' the other? (I.e., they might dodge each other at the intersection by choosing different levels of molecular lineups to travel along – like the slightly different altitudes that airplanes are assigned, depending on whether they are flying 'to or from' the major airport? Or by somehow pre-sensing whether to slightly slowdown or accelerate, and pre-arranging spacings relative to those approaching them at right angles – like courteous drivers! Or, on the other hand, maybe magnetic fields or other problems would render my above superconductive 'thought-experiment' impractical, or doom it to fail due to friction!)

Historically, at least one theory has been proposed to help explain one aspect of superconductivity. Basically it involves electrons flowing in pairs with their spins canceling out, so that they have zero viscosity (or the like). [4]

And historically, at least one theory has been proposed to help explain one aspect of the superfluidity of helium. Basically it involves the lengthening of the De-Bloglie wave length that is associated with a liquid helium atom's movement. The mass of a helium atom is very low anyway**;** and that, together with its having a slow speed (at very low temperatures), **--** results in its De-Bloglie wavelength being very long. I.e., with

decreasing temperatures, its De-Bloglie wavelength lengthens, and it reaches its helium neighbors or beyond. The result is eligibility for 'quantum-like' behavior and superfluidity, instead of conventional behavior that we are accustomed to. [5] Specialists are more knowledgeable than I, regarding the details**;** but to me it is a bit analogous to the lengthening antennas on bugs, enabling them to dodge others things, or the 'sonar' collision avoidance sensing that bats have.

Let us also mention, that even in Compton scattering, the deflected photon stays together, even after it loses some of its mass to the electron during its 'collision'. This is a very important trait, an astounding aspect; and somewhat surprising when we contemplate that many nuclei and elementary particles do not stay intact (as a single entity) after high energy collisions. (They may shatter and split up into many mesons or other things.) That 'stays-together' aspect of a photon is one more special feature, (not to be overlooked or marginalized)**;** and it seems to hint at other 'wondrous' possible features – maybe the ability to 'dodge' other photons, and still maintain its direction, energy, and momentum. (Of course, I do not believe that photons or any other entity possesses innate attraction, to hold itself together or intact. And therefore I believe that a remarkable surrounding aether, and its pressures and its interactions with spinning 'globs', keeps those 'intact globs' indeed intact!)

A few NPA members, and a few scientists who interact with them, have proposed helpful models for 'photons', whether they are altogether perfect and complete or not. And some of the models have aspects that might help us to understand how photons play 'dodge-ball' with one another, if that dodging turns out to occur. My own article, here, will not further address photon modeling, because my long-standing priority has been the following**:** To first meaningfully classify the different actions in physics, like Linnaeus did for biology, in hopes to establish useful and meaningful relationships and patterns. Then, hopefully, that will result in the creation of a clear, big, 'overall picture' -- helpful to those seeking to concoct new unifying theories. And also helping those, who already have theories, to present them more effectively, impressively and comprehensibly!

4…Summary and Conclusions**:**

I have recently developed interesting thoughts or insights into a half-dozen Physics-related topics. But with everyone's time short**;** I presented only the above, i.e., implications of crisscrossing laser beams, because of its greater importance. It is so basically fundamental and compelling**;** and it seems to have been previously ignored, or marginalized, or addressed too abstractly or obscurely to benefit many people in science. Scientists should strive also to present the things that surprise us by their not occurring, not just the things that don't surprise us by their occurring (as expected)!

Frankly, the question of whether a beam of light (or its photons) can partially deflect another beam (or its photons) that cross it – is a question quite appropriate to be addressed clearly for students at an early age. Even in grade school, or early high school, and surely, although tardily, in a serious college elementary physics course. (My roughly 1000-page elementary physics textbook sure avoided it!). As an old joke goes, "You can read a thick treatise on '*Theory and Properties of Fluids*', and come out not knowing that 'water is wet'!"

How astounding it is that no photon seems to shatter into many smaller photons when any photon hits an electron or proton at an angle. Light is a rather poorly understood phenomena. Even ***Einstein***, at an advanced age, complained that he had ***not*** been able to form a satisfactory model of his photon or concept of it. How many students of science or even graduated adults realize ***that,*** and its significance? [6]

Added to that complexity, I think that many experiments indicate that 'the main fields associated with light', and the main photon 'particle' (traveling at 'C') associated with those fields, -- can become greatly separated. I.e., when one reaches its destination the other may not have arrived yet, and vise verse. It has been sadly counterproductive, confusing, distractive, and tragic that drastic scientific assumptions, conclusions, and theories have been generally accepted as correct even though they go far beyond what is justified by limited or questionable basics! I.e., the 'strange' realities described in the last two paragraphs. (Actually, that propensity -- to assume and conclude too much -- is a problem that has often plagued many different civilizations, in their tackling of many challenges, during the thousands of years of human history.)

It is very important both to recognize different important events, and also to try to prioritize the relevancy of those events correctly. Modern physics suffers greatly from a **shortage** of that, in my opinion!

A few authors and presenters have rightly expressed some of their concern after reading some forwards to works, introducing 'Einstein Relativity'. Those 'forwards' boasted that the great thing about Relativity is that "all distinctions become blurred, and one thing merges into another". One thoughtful critic of these 'forwards' commented that previously it was considered one sign of humans' advanced intelligence that humans could discern important distinctions, remember them, and highlight them—not obfuscate them. I agree with scientists who emphasize distinctions**.** **A**nd I think that 'continuing to wisely note and emphasize distinctions' can greatly aid progress toward a coherent, cohesive physics; and in making similar progress in other fields and endeavors. Just as it was central to the successes of Linnaeus, Darwin, and Mendeleyev in earlier times.

References**:**

[**1**] D. L. Burke, R. C. Field, G. Horton-Smith, J. E. Spencer, and D. Walz, "Positron Production in Multiphoton Light-by-Light Scattering", Phys. Rev. Lett. 79, 1626 - 1629 (1997)

[**2**] Regret I can no longer find reference**;** but the gist of it was this**:** The probability of interaction between high energy gamma rays occurring from a star and the likelihood that we could observe that star detail – would be too low for us to likely confirm such phenomena. (When surfing the Internet for 'photon-scattering-photon' information, or using similar wording; the following problem typically occurs**:** One is guided to abstracts that, disappointingly, give no indication that such 'photon-against-photon deflections' are actually discussed in the article's text.)

[**3**] H. Semat, "Introduction to Atomic and Nuclear Physics",15-9, see paragraph describing two neutrinos with minimum combined energy of 51 Mev (Reaction 15**.**8), and one neutrino with minimum energy of 100 Mev (Reaction 15**.**9)
[**4**] R. L. Carroll, "Superconductivity and Electron Viscosity", Galilean Electrodynamics, Vol. 2, no. 1, (Jan./Feb., 1991)
[**5**] J. J. Niemela, "Reconnecting to Superfluid Turbulence"**;** A reference to that on the Internet appears as follows**:** "Viewpoint: SuperfluidityQuantum Mechanics Fluid Dynamics, Physics 1, 26 (2008) DOI: 10.1103/Physics.1.26; Published October 6, 2008" (About one-fourth of the way through his article, Niemela infers that the extending of the De Broglie wavelength from one helium atom to another -- promotes interactions leading to a net combined spin equaling zero and thus zero viscosity.)
[**6**] P. Spezialli, Ed., "Albert Einstein-Michele Besso, Correspondence 1903-1955", (Paris: Hermann, 1972), p. 265**;** Also see**:**
http://specialcollections.vassar.edu/exhibits/einstein/essay2.html