

Heuristic Essay on a Hypothetical Quanta-Aether Relation

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The present essay extends - *heuristically modum* - the in paper [3] forwarded hypothesis of an all-space-filling substantial aether which could explain inertia intuitively. One approaches quantum physics by considering essentially the elementary particle's two slits interference problem as well as the problematic of a single electron orbiting a nucleus. In broad lines and at a qualitative level a somehow significant correspondence with Schrödinger's mathematics is revealed, yet with some differences concerning the expected interference spectra aspect."

1. Introduction

A friend of mine, somehow trained into the philosophy of religions, used to say: "you have to be a strong believer to think really atheistically!"

I experienced something like that - on a life-long term - while remaining faithfully atheistic with regard to the Special Theory of Relativity - as Albert Einstein motivated it, [1]. More explicitly expressed: I stood faithfully convinced that a true understanding of the Universe is impossible without assuming the physical existence of a *substantial aether*. So, I refused atheistic-modum to believe in *space* as an entity provided with *physical capabilities*.

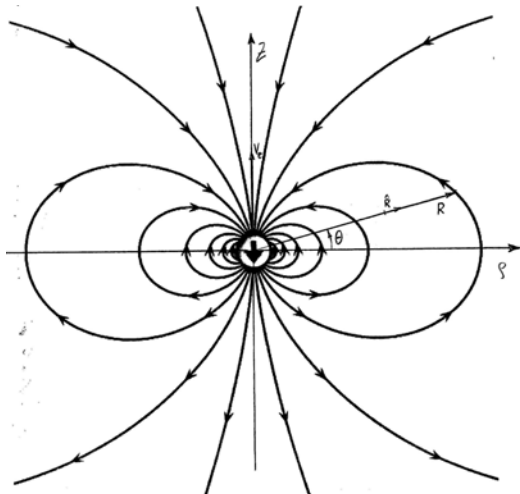


Fig. 1. Image of the in [3] assumed "contraflow" field of speeds induced into the surrounding aether by an elementary particle moving with speed v_e relative to the assumed uniformly motionless aether at large. (Pattern adapted using "VFPT dipole point.svg - Wikipedia, the free encyclopedia" [4]).

Being somehow gifted - yet more probably by fate **just** condemned - to bear a brain so 'wired' as to make me unable to understand nature otherwise than the aether's way, I found myself bound to stubbornly - along a surprisingly long life - endeavor to assimilate physics via an imagined *substantial* energy carrier. Factually, I grew as a faithful believer in a still not discerned, yet believed existent, very subtle physical medium assumed present *everywhere* space may be thought of - and also in H.E. Ives in-

strumental-mode defined [2] - medium imagined as the universal energy carrier/transmitter. In that spirit I forwarded an essay [3], suggesting that any moving elementary particle should induce into the surrounding 'aether' a field of velocities configured somehow as a dipolar *contraflow* (Fig. 1). A hypothesis assumed in hope to become able to understand and imagine in a more intuitive way the *phenomenon of inertia*.

In a message sent the 12th of June 2011 to the *Galilean Electrodynamics* revue, I reported the negative result displayed by an experience in that sense aimed and in [3] described, interpreting the negative result - disturbing at first sight - as simply normal if one assumes *inertia* too as essentially *electromagnetic* in its very nature.

Extending that trend of mind, the present exposé tries to find out what chances a hypothesis as in [3] suggested may have to merge with the quanta theory as yet developed and philosophized.

2. Preliminaries

A starting point chosen with this intent can be Albert Einstein's assumption - based on Max Planck's quanta theory of radiant energy - *that every elementary particle is linked to a wave*, an assumption abstractly synthesized in the lapidary vector-form:

$$\mathbf{p} = \hbar \mathbf{k} \quad (1)$$

with \mathbf{k} representing the 'angular wave-number' of the assumed 'undulation' [5].

Once physics integrated the above relation as a *phenomenological truth*, improved knowledge was pursued in the *Quantum Theory of Matter* mode of thinking.

From its very birth, the theory was logically esoteric. One is entitled to think so if one minds that its operational formalism is based on the assumption that physical entities as *momentum*, respectively *energy*, are assumed *formally interchangeable* with purely mathematical symbols as "*differentiation with respect to position*" for the first, "*differentiation with respect to time*" for the second.

But "*how can momentum actually be identified with a differential operator*" asks - practicing an elementary good sense - Robert Penrose, commenting further: "*of course, all this replacing momentum and energy by differential operators look like so much mathematical mumbo-jumbo*". [6], p. 499.

Yet practice of that “*mumbo-jumbo mathematics*” led to the *undulatory theory of matter* built in its ensemble on the single, powerful Schrödinger formula:

$$i\hbar \frac{\partial \Psi}{\partial t} = H\Psi = \frac{-\hbar^2}{2m} \nabla^2 \Psi + V(x)\Psi \quad (2)$$

and its formal general – one-dimensional - solution

$$\Psi(t, x) = W(t, x) e^{i(kx - \omega t)} \quad (3)$$

in Christoph’s Sciller notations reproduced [7], p. 78.

It seems that after that nothing has to be added with regard to the theory’s *meaning* and *operating* procedures. It seems so because a huge mass of realities became in that way consistently and accurately by pure theory predictable with a degree of precision above all expectations.

Yet the true sense - as well as the deep meaning of the so elaborated *procedure* - remain in a kind of unintelligible mist. Obviously, “*how can a momentum actually be identified with a differential operator*” asks mathematician Roger Penrose, adding the above quoted comment.

One may argue that a couple of entities must not compulsorily be *identical* in nature or sense to entitle somebody to *process* them in a same *mathematic-procedural way*. Yet, even if so justified, the argument remains, seemingly, devoid of any clear-cut *intuitive* reference-image, or sense and, by that, certainly discouraging to anybody inclined to investigate into the true meaning of nature’s laws.

In spite of the evident sensitivity of the subject I dare approach it, yet not lured it could be improved in its meaning, still in hope that by means of the *aether-contraflow* hypothesis – assumed in [3] in intent to represent intuitively mechanical inertia – one may configure Schrödinger’s mathematical abstractness in a somehow more intuitive descriptive image which, of course, must retain the insight conquered by the Quantum Theory as yet developed.

A first step that way oriented can be to search for a deeper understanding of what “*undulate*” really may mean when looked from the point of view of the substantial model in [3] outlined. In essence, to clearly outline not only what *substance*, yet also what *substantial structure* may be supposed *undulate* when tentatively described – as in the present approach – via a mathematical Schrödinger-formalism *ad hoc adapted*; what *substance* - in lieu of purely *mathematical probabilities* of phenomenological incidences – is to be taken into consideration?

Essentially, the so engaged investigation shows itself as a tentative to shift knowledge from a non-intuitive mode of thinking – one *describing* the world by means of images as from a wizard’s machine extracted – towards an as much as possible intuitive mode of understanding the universe’s phenomenology; essentially, to try imagine the universe as if composed - *in all its details and wholeness* - exclusively from *substantial* elements. Or rather digressively commented: to get out of Niels Bohr accusation that “*Anyone who is not shocked by the quantum theory does not understand it*”.

Now what may be presumed proper – perhaps also specific – to an elementary particle which evolves under its own determinants through an at all levels *substantial world*? What substantial

system would be *obliged* – by the very nature of the universe’s machinery – *to undulate* when interactively linked with a *moving* elementary particle?

If looked at from a historic point of view, one may state: by Schrödinger’s hypotheses – some 85 years ago delivered and till now extensively confirmed in spite of its abstractness – supposed to undulate is a *mathematical* function so defined as to satisfy four major constraints:

1. the in it participating values have to depend - in a precise and specific mode - from the particle’s total energy,
2. the ‘undulation’ energy - whatever one would consider undulating – must be, by Planck and Einstein hypotheses, equal to $h\nu$,
3. the particle’s momentum, \mathbf{p} , has to be – by de Broglie hypothesis – equal to $\hbar\mathbf{k}$,
4. the energy determining fields are presumed derivable from potentials, so that superposition of effects should be granted.

Schrödinger demonstrated that his above quoted equation can, by way of its general solution, *show* - via probabilities - how an elementary particle evolves into the usual three-dimensional space - the ample practical result of his mathematics being nearly a century of largely extended theoretical successes confirmed by factual scientific measurements – convincing example being the strong agreement between the in this way calculated frequencies of atomic spectra when compared to the by experience delivered data.

Still, for those who have the desire to get out from the black-box mode of thinking physics the need for a fundamental sense sustained by an intuitive representation of Ψ constitutes a ‘*must*’. Yet so long the physical meaning of factor W in Schrödinger’s solution – or, minimally, its *dimensional composition* – is not précised, it is obvious that Ψ shall remain a *pure mathematical entity*, an expression only *evocative* - in a most general way - of some phenomenological truths. Those who want to really know the *physical meaning* of Schrödinger’s equation have to find out - by way of hypothetic imagining or simply by principle-statement and experimental confirmation - what kind of *physical entity* W may symbolize.

The fact that Schrödinger’s equation, even if devoid as it is of any clear conditioning on the nature of W , proves to be valid and so extensively *representative* – yet not explicative I dare say - of many physical phenomena suggests that Ψ must be the *generic image of a field-entity* largely present in the physical world, its specific nature not yet identified.

Observing that one needs not know W ’s *physical* nature – not even its *dimensional composition* - to rightly validate Schrödinger’s solution suggests that no specific restrictions limit *the freedom to imagine* intuitive-explanatory models. Following that clue one shall observe that Schrödinger, in its first approach of the problem, defined Ψ as a 3D vector entity and compare it with the aether approach where the *contraflow* strength M_{iner} - believed in [3] to be responsible for inertia - is 3D defined, *i.e.* by its *dipole strength* and by *alignment along the particle’s velocity*.

If one considers that coincidence as a clue, it is simply straightforward-thinking to try the assumption:

$$\Psi = M_{\text{iner}} + M_{\text{Schr}} \quad (4)$$

by which one assumes Ψ to be linearly composed of two distinct components, *both of them velocity-determined yet very different in their significance.*

The M_{iner} component, considered explanatory for the *inertia phenomenon* as manifested at the macroscopic level, was defined in [3] as *moment* of a dipolar *velocities-field* (Fig.1), induced into the surrounding aether by a moving elementary particle. The aether-field's *shape* so generated was assumed moving together with the particle as if bound to it. Obviously, the speed relative to the aether - imagined as a steady, all-immersing, continuous and boundless ocean - of a particle moving *free of constraints* through an *inertial space* shall be constant, the consequence being M_{iner} appears, by definition, time-independent.

Further, when considering an elementary particle *moving freely* in laboratory conditions - the aether's flow at a laboratory scale (black holes excluded), is not imaginable otherwise than steady and uniform - M_{iner} must be also position-independent, the consequence being that M_{iner} remains *variable only by the particle's velocity* relative to the aether **at large** - supposed extended as far as a physically-definable spatial infinity is possible.

3. Configuring the Premises

The essential outcome of the above inferences is that for a *free-moving* elementary particle - *i.e.* one moving free of constraints into a *inertial space* - M_{iner} has to be *constant*. So, the consequence: *all mathematical results won by the quanta theory as till now philosophized* - specifically as mathematical consequences of Schrödinger's reduced solution $\Psi(\mathbf{x}, t) = W(\mathbf{x}, t)e^{i(\mathbf{k}\cdot\mathbf{x} - \omega t)}$ - remain valid in the present approach's conception also, the actual formulation being:

$$\Psi(\mathbf{x}, t) = M_{\text{Schr}} e^{i(\mathbf{k}\cdot\mathbf{x} - \omega t)} \quad (5)$$

To be true, the above assertion imposes M_{Schr} to be identified as the *undulatory component* of the **total** contraflow's *moment* \mathbf{M} , the strength of both components of \mathbf{M} being assumed functions of the particle's *mass* by its *speed* product.

But if the answer is that way framed, it looks like as if a same mathematical formalism merely operates on two essentially similar mathematical entities. So, what would be the difference with Schrödinger's philosophy?

The real, *essential* difference resides in the fact that in Schrödinger's equation W is defined as a *mathematical* - *i.e.* abstract, *non substantial* entity, while M_{Schr} - as assumed in the present approach - is stated as an *instrumentally measurable physical entity*; as a part of a *substantial* system. The consequence is that, compulsorily, the solutions offered by these two different modes of thinking must also differ essentially in their physical meaning and consequences. While by Schrödinger's philosophy the *probability* that some particular physical event shall occur *results directly from principled calculus*, in the frame of the above suggested aether conception the solution results *indirectly*, factually by *unfolding the aether's velocities-field spectrum* proper to the implied phenomenon and by working out of it the looked after consequences. *This signifies one infer the natural phenomena to run on a*

higher degree of complexity than the one supposed by Schrodinger's mathematics.

Clues appropriate to enlighten the understanding of the enlarged complexity so inferred are easily found by considering, as an example, the two slits *electron interference* phenomenon. In this example Schrödinger's quantum theory allows us to calculate - *on the basis of pure mathematical assumptions* - the electrons' distribution on a target screen. On the contrary, the aether hypothesis asks preliminary questions to be first answered, essentially: what are the *causal determinants* of the aether's flow-field evolution? Somehow more specifically sketched:

1. Does sharp *local* perturbations into the aether's speeds field generate wave-like propagating phenomena?
2. and, if so, at what propagating speed?
3. In what manner do contra-flows interact with compact matter?
4. Are those interactions energy conservative?

At the heuristic level here engaged, some intuitive guesses may be forwarded:

1. By consequence of the aether having always been considered carrier of all sorts of electromagnetic waves, one may hypothesize that any brisk local change into the aether's speeds field - change shaped as a wandering *perturbation* shall **propagate**, with speed c , as a spatially well configured phenomenon.
2. The energy as well as the momentum - classically considered proper to a moving elementary particle of non-zero mass - are in the present attempt supposed *distributed into the entire contraflow field* by the moving particle generated.
3. Wherever the aether flow encounters a compact material structure the flow will be deviated in a specific - well determined by the nature and structure of the obstacle - way. The phenomenon is assumed *energy-* yet not also *momentum-* conservative.
4. If on the path of a free-moving particle the associated *contraflow* is by some obstacle deformed or disturbed, its normal shape will be restored by with speed c propagating reactions, the process being assumed energy-conservative yet not momentum conservative. This means that the rebuilt contra-flow, after having past the obstacle, shall carry a momentum modified in a well determined way; explicitly expressed: that the *value* of the elementary particle's speed will not be modified, yet its *trajectory shall be bent*.

To endorse *without precaution* a so assembled thought-model would be obviously precarious. Yet its elucidative power can be tested by engaging it to tentatively explain a well known physical process, in fact examining the *electron two slits interference phenomenon*. A first step at that intent aimed shall be imagining how the associated aether contra-flow passes the slotted panel and, after that, how it rebuilds its shape in the new environment. The conceptual difficulty in this case arises from the fact one does not know how intimate causalities, proper to the aether internal linkages, determines its own phenomenology.

So, here begins the really heuristic adventure - yet an unavoidable experience in any kind of new knowledge development.

It is naturally so because enlarging knowledge always begins by *imagining* something apparently askew, shaping it progressively into decently-logic *hypotheses*, building on them an as coherent as possible *abstract model* to be eventually developed into a *quantitative* to-be-tested theory.

When thinking of an electron flying through one of a pair of parallel narrow slits - close together cut into a thin panel - one shall imagine the induced contra-flow field, while unitary in front of the slotted screen yet coming out of it clearly divided. However this dramatically simplifies the reality by that it only sketches *macroscopically* the elementary particle's complex interaction with the atoms bound into the slit's walls. Still the simplification seems acceptable if one supposes the interaction between contraflow and atoms into the slit's borders to be *energy-conservative* and also that the electron passes the slit by its *very middle*, avoiding so the deviating influence of the into the slits' margins atoms.

4. Analysis of the Consequences

A first hypothetical extension to be taken into account - explanatory in intent - is that the electron when emerging from the slit will have to restore the contra-flow - divided by its passing the slits - again into its normal steady shape. The committed consequence of this intensely asymmetrical process shall, without doubt, modify the contra-flow's axis orientation and, by that, the electron's trajectory also.

One may call in attention here a hypothesis somehow "in the air" till Maxwell's times, specifically that both *energy* and *momentum* - most often considered *trapped into* the very particle's body - are, in fact, *distributed into the whole contra-flow's domain*. Or otherwise said: *spread into the entire field assumed in [3] as explaining, intuitively, inertia*.

To step further in that mode of thinking requires us to configure - even if only by sketched hypotheses - the contra-flow's field structure. Assuming - at the present exposé's knowledge level - the aether to be *continuous, conservative* and *non-compressible*, the contra-flow's speed field of a moving particle should *look* absolutely alike an electric dipole's one - this by consequence of the same $1/R^2$ definition law - the aether *speed* in every point of the field simply substituting - affine mode - the *electric vector*.

Adapted from Wikipedia's Free Encyclopedia formulation [8], one has:

$$\vec{v} = \frac{1}{4\pi R^3} \left[(3\vec{M}_{\text{Schr}} \cdot \hat{R})\hat{R} - \vec{M}_{\text{Schr}} \right] \quad (6)$$

with the adapted symbolism also in Fig. 1 indicated.

Supposing the elementary particle is internally center-point symmetric, the aether contra-flow field shall be cylindrically symmetric organized with the consequence that the above relation, when explicitly written, will take the form:

$$v_z = \frac{M_{\text{Schr}}}{4\pi R^3} (3\sin^2 \theta - 1); \quad v_\rho = -\frac{3M_{\text{Schr}}}{4\pi R^3} \cos \theta \sin \theta \quad (7)$$

the meaning of symbols z , ρ and θ being shown in Fig 1.

Once the solving means are so configured one might be drawn to believe that the contra-flow evolution of an elementary

particle, when impinging on a dense screen, may result from \vec{M}_{Schr} 's oscillatory character in the same way Schrödinger's Ψ exercises it.

Yet it is not quite so simple. On the contrary of Schrödinger's *operational concept* of "undulation" - symbolized by Ψ and considered of *wave-like* specificity and "probabilistic-determinacy", as Max Born showed yet in 1926 - the undulating character of the contraflow field by \vec{M}_{Schr} symbolized presumes the evolution of *real velocities* into a *substantial medium* developed. The consequence is that \vec{M}_{Schr} has to be imagined in the real 3M space - not in Ψ 's *i*-complex manifold - so that it may be expressed rationally; for instance, as:

$$\vec{M}_{\text{Schr}} = \vec{M} \sin(\omega t + \theta_0) \quad (8)$$

the most significant variable ω being deducible directly from the very quanta principle $\mathbf{p} = \hbar \mathbf{k}$. Important to mind is that both \vec{M}_{Schr} and ω are on the product mv dependent.

If so presumed, it is obvious that by passing through the double-slotted panel the contra-flow shall be *factually* sliced and strongly deformed. Still, as consequence \vec{M}_{Schr} is by definition assumed *dynamically harmonic* and the phenomenon supposed energy-conservative, the particle's *contra-flow* - divided into two separate fields by its passing-through the two slits - should evolve so as to progressively reconstitute its *initial* shape; yet the process being strongly asymmetric, the contra-flow shall not *keep* its orientation.

The consequence of the preceding considerations is that the trajectory of an elementary particle that passes *through one of the slits* shall be, most often, bent.

A clue by which the process could be better understood may come out from considering particles passing, gathered in a *well collimated fascicle*, through *the middle* of one of the slits. Presuming in first place that **all** particles pass the slit - eventually successively - at the very moment *their own* \vec{M}_{Schr} phase $\omega t + \theta_0$ is *zero*, the interaction with the slit's margins will be *intrinsically* nil. The significant consequence is that all particles will travel on a same unbent trajectory and hit the target-screen in a single point-like spot.

Now, supposing the conditions are changed so that some particles shall approach the slot at a moment when their \vec{M}_{Schr} phase is significantly *different from zero*, their associated contra-flow shall then be dramatically modified.

Fig. 2 illustrates the so imagined transit process. One observes that just before passing the slit all the contraflow's flux-lines are intercepted by the panel (Fig. 2a), while an instant after the elementary particle has passed the slit the particle starts to rebuild from zero its initial, specific contra-flow (Fig. 2c).

Yet, at the very moment the particle passes the slit, a narrow bundle of flux lines may be enabled to close a loop (Fig. 2b). Still that allowance, *i.e.* to close loops - seeming possible without restrictions if *exclusively* from a geometrical point of view considered - is, in fact, not free of kinematical restrictions. Obviously, one must mind about the *time* the aether needs to *close* these sort of loops and **compare** it with the time required by the elementary particle to *traverse the slit's depth*.

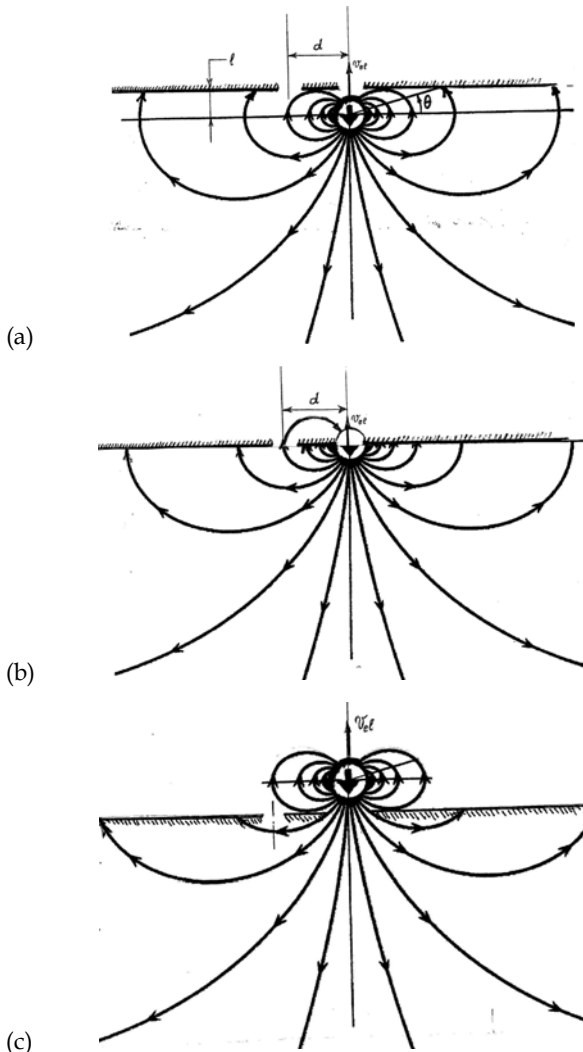


Fig. 2. Flux lines shown when the particle enters the slot (a), passes through it (b), and comes out of it (c).

The fact that the present investigation is performed at a heuristic level allows us - when evaluating the particle's-passing-the-slit time - to approximate the contraflows' flux-lines form by circles (Fig. 3).

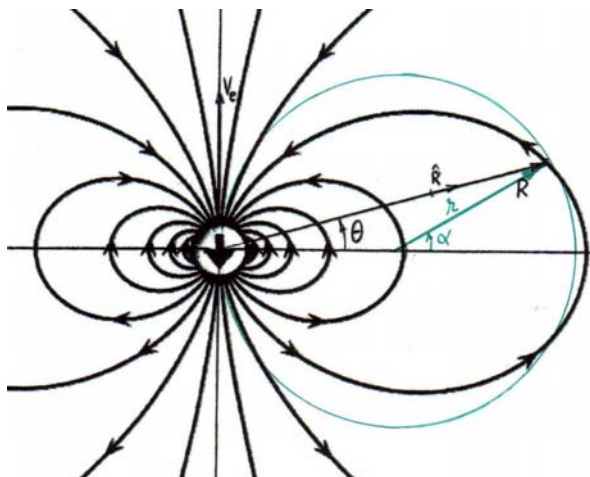


Fig. 3. Approximate flow-line (in green) compared to the real one.

The time a 'bit of aether' needs to close a contra-flow loop is calculable by:

$$\Delta t_{\text{aether}} = \oint \frac{ds}{v_{\text{aether}}}$$

or, with the approximation indicated in Fig. 3:

$$\Delta t_{\text{aether}} = \int_0^{2\pi} \frac{rd\alpha}{v_{\text{aether}}}$$

One shall precise here that v_{aether} , which depends on M_{Schr} 's value - symbolizes the speed at which the aether is supposed to flow along the involved loop. Obviously, that speed differs from the one with which a perturbation is assumed to propagate into the aether.

Taking into account that $\theta = \alpha/2$, $R = 2r \cos(\alpha/2)$, $r = d/2$ (Figs. 2 and 3), and that the contra-flow field is shaped as a perfect analog of the electric dipole - symbolized by Eq. (6), explicitated in (7) - one obtains:

$$v_{\text{aether}} = \left(\frac{3M_{\text{Schr}}}{32r^3} \right) \left(\frac{1}{\cos^3(\alpha/2)} \right) \sqrt{\sin^4 \frac{\alpha}{2} + \frac{1}{3} \sin^2 \frac{\alpha}{2} + \cos^2 \frac{\alpha}{2} \sin^2 \frac{\alpha}{2}}$$

It follows that the time asked for the aether to close a loop passing through both slits will be:

$$\Delta t_{\text{aether}} = \int_0^{2\pi} \frac{rd\alpha}{v_{\text{aether}}} \equiv \frac{2d^4}{3M_{\text{Schr}}} \frac{\cos^3(\alpha/2) d\alpha}{\int_0^{2\pi} \sqrt{\sin^4 \frac{\alpha}{2} + \frac{1}{3} \sin^2 \frac{\alpha}{2} + \cos^2 \frac{\alpha}{2} \sin^2 \frac{\alpha}{2}}}$$

Observing that the anomaly induced by the integrand's denominator at $\alpha = \pi$ can be avoided by 'jumping' over that point - the contribution to Δt_{aether} in that zone is practically nil - and that the integration is performed between well defined limits, one concludes that the integral builds a factor of constant value; a value relying exclusively on the device's geometry. On the contrary, the second term that determines the aether looping time, i.e. M_{Schr} , is variable, relying on particulars of the involved particle and on experimental conditionings.

So, the formal conclusion:

$$\Delta t_{\text{aether}} = \frac{\text{const}}{M_{\text{Schr}}} \tag{7}$$

The essential consequence out-coming from the so resulted relation is that, with regard of a single particle, only a limited number of aether bundles shaped as closed loops can encircle both slits and, by that, contribute to the contra-flow's restoration behind the slotted panel.

It is worth observing that the essentially determinant factor of the phenomenon is M_{Schr} alone.

Now, thinking more carefully about the meaning of Δt_{aether} ; i.e., the time the aether needs to build a closed loop passing both slits - one concludes it gains a significance only if compared with the time a particle needs to pass the slit's thickness.

Kind of digressively, one reiterate the assumption that only closed loops will not perturb, yet assist a steady rebuild of the contra-flow behind the slotted panel.

The electron's through the slit passing time, deduced on basis of the in Figs. 2/b and 3 indicated geometry, is expressible as:

$$\Delta t_{\text{electron}} = \frac{d}{v_{\text{electron}}} \quad (8)$$

Yet essentially significant is not the time interval $\Delta t_{\text{electron}}$ itself, but the quotient

$$Q \equiv \Delta t_{\text{electron}} / \Delta t_{\text{aether}} \quad (9)$$

the value of which can tell if and under what conditions the *before-the-slits* contraflow can contribute to the *after-the-slits* contraflow's rebuilding. In fact it tells how much of a loop or, in accordance of Q 's value, how many loops are run while the particle passes the slit.

Expressing Q explicitly in its functional structure and symbolizing by \Im the integral's value, one finds:

$$Q = \frac{3\Im A \sin(\omega t + \theta)}{2d^3 v_{\text{electron}}} \quad (10)$$

This expression shows that Q depends from a number of constant factors - the value of A not yet determined. Its role as indicator of a physical reality is determined by the *sinus'* term value, specifically by the value of its argument $\omega t + \theta$ at the moment the particle accesses the slit.

Supposing that all elementary particles reach the slit gathered in a well collimated fascicle and also adopting the simplified notation $\varphi(t) = \omega t + \theta$ one foresees - as earlier stated - that those elementary particles who pass the slit at a $\varphi(t) = 0$ shall suffer no trajectory deviation.

5. Determinism from Randomness

Considering further that $\varphi(t)$ is progressively increased by small ads one may foresee that this state of things will *not be modified* until $\varphi(t)$ reaches a value, let's say φ_1 , at which a first loop is allowed to close. The consequence shall be that all particles which pass without any closed loop in its contra-flow shall follow *unbent trajectories* - statement based on the belief that an *incoherent* package of flow passing the slits will not contribute to a contra-flow coherent rebuilding behind the slotted panel.

Supposed now the fascicled particles approach the slit with $\varphi(t)$ values *randomly* distributed, by passing through it they will be settled into precisely defined intervals of $\varphi(t)$, let's say: φ_1 to φ_2 ; $\varphi_2 - \varphi_3$; ...; $\varphi_{n-1} - \varphi_n$, corresponding to a precisely determined number 1, 2, 3, ..., n , of closed loops run into their contraflows. That process of fractionate-selection will contribute in selectively reshaping the contra-flow behind the slits, the compulsory consequence being a bending in *steps* of the particles' trajectories. So, the conclusion: bundles of elementary particles conditioned by phase-values of $\varphi(t)$ *randomly distributed* shall build on a target-screen point or line spectra.

Yet one should mind that in the here forwarded aether conception a specter so built cannot extend itself beyond a certain limit corresponding to a definite φ_{max} , a value somehow in the vicinity of $\varphi(t) = \pi/2$. This hypothetical forecast, if confirmed, would contradict Schrödinger's theory, which foresees that the specter's lines shall extend until at large, yet with intensities evanescent if by probabilities evaluated.

A completing detail worth to be mentioned is that one side of the specter is built on the positive alternance of the $\sin(\omega t + \theta)$ function, while the negative one determines the specter's second half.

One shall mind that all the above comments refer to elementary particles on tracks clear of any scattering on the slits' walls. This restriction suggests that most interesting for the so approached subject would be experiences run with neutrons in a well collimated fascicle. Is this possible?

A somehow related comment to the above developed problematic can be the hypothetic forethought that the more energetic the particle, the bigger should be $A \sin \varphi$ to allow closing a *definite number of loops*. Yet, if A would prove to be constant or only slightly dependent of v_{electron} , this term will not be allowed to exceed a certain maximum value. That would make that the greater v_{electron} would be, the lesser the number of allowed loop-levels. This on theory based conclusion may match the known fact that the more energetic the particle, the more *particle-like* its behavior, the less *undulating-like* its look.

Now, this point once reached, it seems that heuristics should end here and really quantitative reasoning should settle the answers. I shall not venture to try that myself. Somebody cleverer and more learned than I am will perhaps approach, in that mode, the subject - supposed the subject looks attractive.

Yet by nature not really discreet molded, I feel unable to renounce to further hunt the idea of a *on-aether-running universe model*. The consequence is I sin further by venturing to throw a look into the electron-proton, coulomb-bound, problem.

Supposing the electron initially at large and moving towards an attracting proton, its approach will be a kind of gradually compacting spiral. Yet, when reaching some level of spiraling compactness, it is likely the electron will somehow begin to "*interfere with itself*". Or, somehow more explicitly suggested: the phenomenon is imaginable as a kind of *aether-hysteresis*, meaning that when a particle, engaged in a cyclic phenomenon, first passes through a zone of *steady* aether, it will - by its contra-flow action itself - somehow *displace* the before existing aether's locations. This means that, after the particle passed by, parts of the local aether will no more be in the same place and state they were in before. If the phenomenon is supposed geometrically recurrent and evolving in such a way that when the particle passes again in the same geometric vicinity as before, yet with an undulation phase increased by 2π - *i.e.* $\omega t_2 \equiv \omega t_1 + 2\pi n$ ($n = \text{positive integer}$) - the previous local aether displacements will be enforced and by that shall drive the near the particle aether farther out of steadiness.

On the contrary, if at the next turn of the particle its \mathbf{M}_{Schr} phase will differ by an odd multiple of π , then the aether displacements before occurred shall be somehow compensated, the consequence being the ambient aether returning in its previous state, *i.e.* the one assumed to have been initially steady.

The phenomenon, if so imagined, drives us to think the electron allowed to *steadily* orbit the proton only on a number of closed, well determined orbits characterized by that their orbiting time should be

$$T_{\text{orbit}} = \frac{(2n+1)\pi}{\omega} \quad (11)$$

Once this result hypothetically worked out I feel as if I had reached a turning point in my search of a *hypothetical model of aether*. From here on it is obvious that I have or to quit imagining universals, or dare grow even more wildly heuristic as till here.

I am drawn to sin again, so I chose the second option.

Maintaining myself in the same trend of spirit as till here I imagine that the electron, while spiraling towards the nucleus from one *steady* orbit to the next *allowed* one, compulsorily with increasing speed, shall generate – as consequence of an increase in kinetic energy *concomitant* with an increase in contra-flow strength – a flow of aether “squeezed out” from inside its trajectory towards the outside of it. And, daringly, I also hypothesize that this burst of constrained aether “out squeezed” towards the less constrained aether outside the atom, may generate a *wandering aether-flow perturbation* which, configured as a coherent short train of aether velocities-field, will *propagate* – yet not *flow* – as a *wandering flow-field-shape* along the perpendicular to the electron orbiting plane, factually the *z* axis in Fig. 1.

6. Conclusion

Are we yet allowed to imagine – without becoming ridiculous – that such a *field of aether-speeds* may propagate into the aether – eventually until at large – as a *steadily shaped perturbation*?

Trying by imagination to distinguish what causalities would explain such a phenomenon, one may consider the binary elementary particle system as able to develop:

1. an aether velocities structure ‘by squeezing’ generated and believed able to configure into the extended aether a dimensionally limited perturbation of permanent kinematical *shape* which shall *propagate* along the *z* axis with a constant speed – determined by the aether’s intrinsic properties –,
2. a – along the *z* axis aligned – *rotational* component induced by consequence of the electron’s ‘spiralling’ towards the nucleus,
3. in consequence of M_{Schr} being assumed essentially undulatory the *axial* as well as the *rotational* speed-components into the *traveling perturbation* should be Schrödinger-undulatory.

If these assumptions are associated with the supplementary premise that the traveling perturbation shall *propagate* – relative to the environmental aether – with speed *c*, one may wonder if such a structured perturbation may not be identified with the *photon* as till now known. A clue in that sense could reside into

the reciprocal phenomenon of the interaction between a photon the above way imagined passing by an atom-bounded electron.

How could the as above-suggested interaction be imagined intuitively?

A quite daring supposition may be to suppose that the undulating radial speed component into a photonic disturbance – as above imagined – could be at the origin of the electric field, while the tangential component could be linked to the photon’s magnetic component. But is that really plausible?

As a personal *guess* – that is the most I can do – I believe it is.

In prolongation of the till here developed trend of mind a last hypothesis may be suggested:

1. could it be that – by consequence of the proton’s internal symmetry (assumed),
2. of the fact the electron is orbiting in a steady plane, and
3. of the momentum conservation working at that level,
4. one may not wonder if the so assumed photon emission would not be in pairs contrarily polarized and in opposed senses ejected along the perpendicular to the electron’s orbiting plane.? The answer is pending on energy considerations not here approached.

At this point, the obvious conclusion: a prolongation of the above intuitive heuristic towards a quantitatively formulated theory asks for thinking abilities as well as computing power largely exceeding the author’s ones. An optimistic conclusion would be to express the hope that at least one well trained scientist will be attracted by the above presented hypotheses and would decide to prolong the present study towards an adequately developed theory.

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