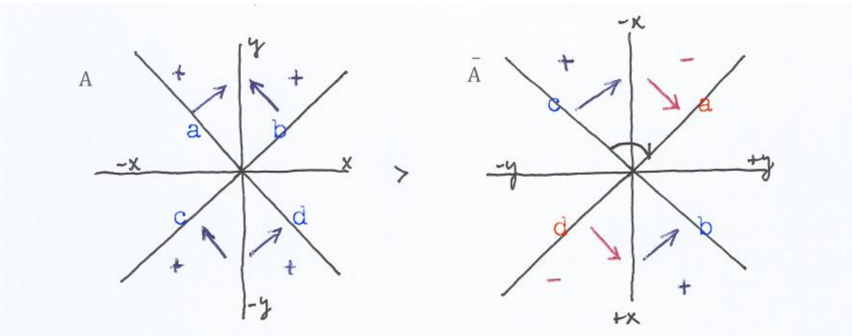
The role of partial complex conjugate derivatives in the Schrödinger equation and its loss of information about the topological evolution of the rotational composite atom

By means of the derivatives of a 2x2 complex matrix, this article proposes that fermions and bosons would be the same topological spaces super symmetrically transformed through time, being fermions the +1/2 or -1/2 partial complex conjugate derivative of bosons and vice versa. Ordinary and complex conjugate equations of all variables could not operate independently of each other, but should be combined to avoid the deletion of half of the system on the description of the atomic nucleus.

A 2x2 complex matrix "A" whose 4 elements are + complex vectors, can be considered as a complex equation of second degree. The operations of transposition, complex conjugation, or inversion, performed by rotating the Z coordinates 90 degrees provide the derivatives of the cyclical complex function.

A first 90 degrees rotation of A gives us its first partial complex conjugate derivative on "Acc."; it's partial because although the whole coordinate rotate, only half of the vectors change their sign, becoming -. The complex conjugation effect is equivalent to a transposition in this context, but identifying the vectors with letters, we see they are not actually transposed:



Rotating Acc. 90 degrees, we get on "-A" the first partial derivative of Acc., changing their sign half of the vectors. As the whole system became negative in "-A", it can be thought that -A is the integer derivative of A, being a second-degree derivative. But Acc. is a partial derivative of degree 1, which implies that the first degree of derivation has not been yet completed. So, -A is not the second-degree derivative of A, it's the first-degree complex derivative of A, where its imaginary part is the - ½ part of Acc and its real part is the -½ part of -A.

This distinction is fundamental because in this context A cannot be directly integrated by -A, bypassing the partial complex conjugate derivative that is Acc, because the degree 1 has not been completely derivate yet. Removing Acc. from the complex differential equation is going to imply the deletion of the description of half of the complex system, the part that is its mirror symmetric antisymmetric counterpart.

That will occur if a complex partial differential equation is used to describe complex systems where several rotational permutations are needed.

In this sense, continuing the rotations, we will see that:

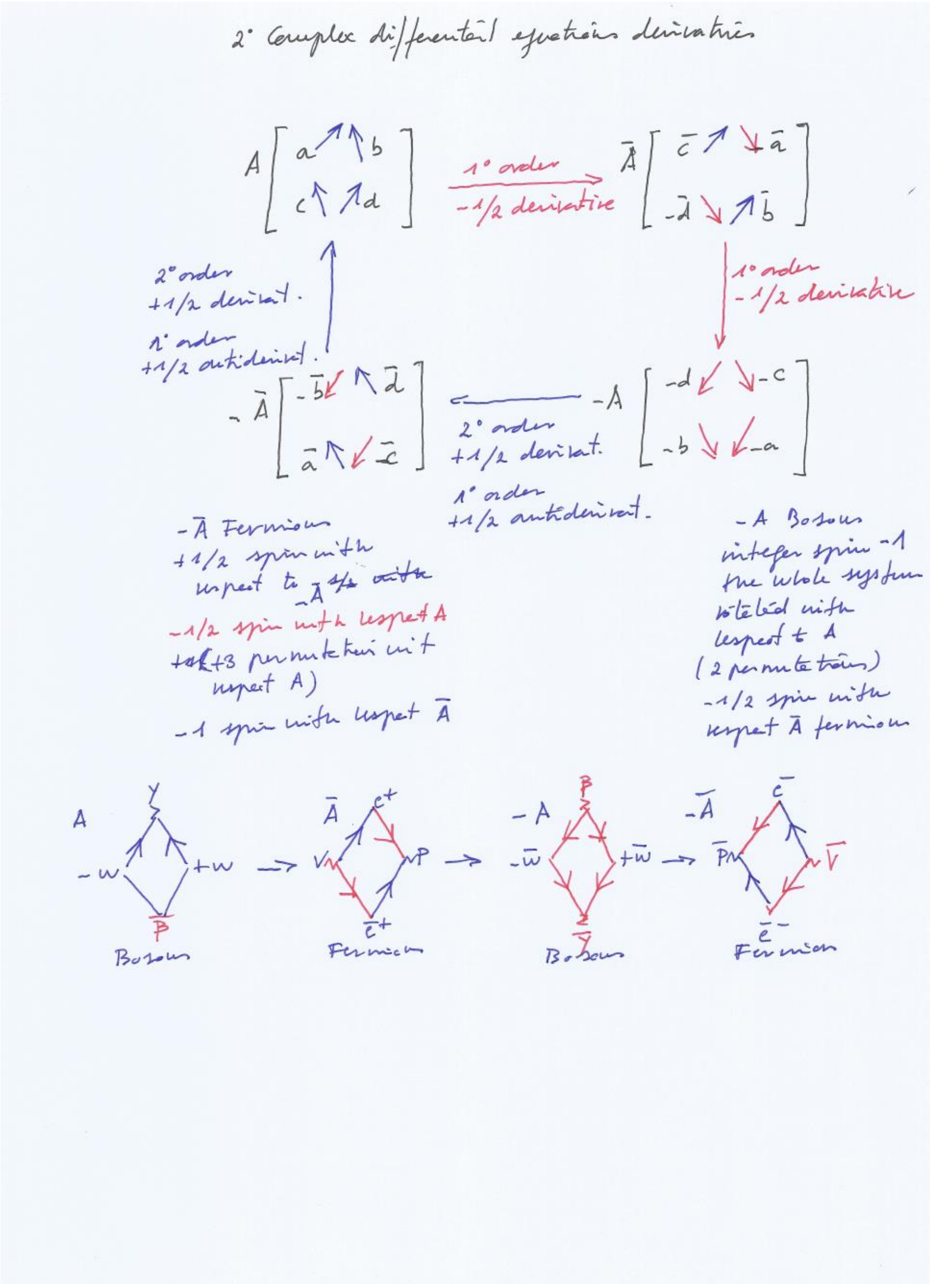
Acc is the ½ i derivative of A

-A is the ½ r derivative of Acc

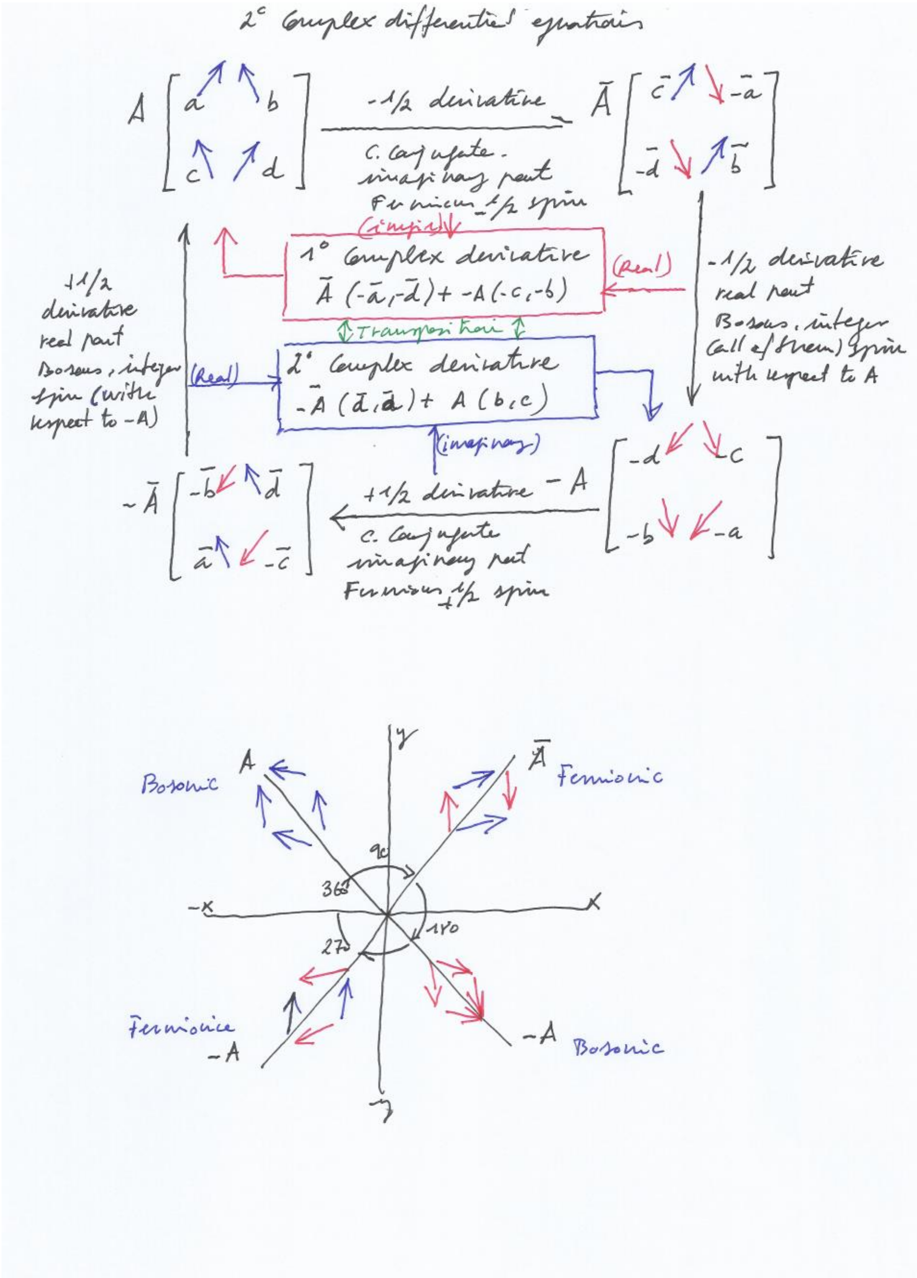
-Acc is the ½ i derivative of –A

A is the ½ r derivative of -Acc.

So, we could say that ½ Acc(i) + -½ -A(r) is the first-degree complex derivative of the complex function, and that –½ -Acc(i) + ½ A(r) is the second-degree complex derivative of the complex function.



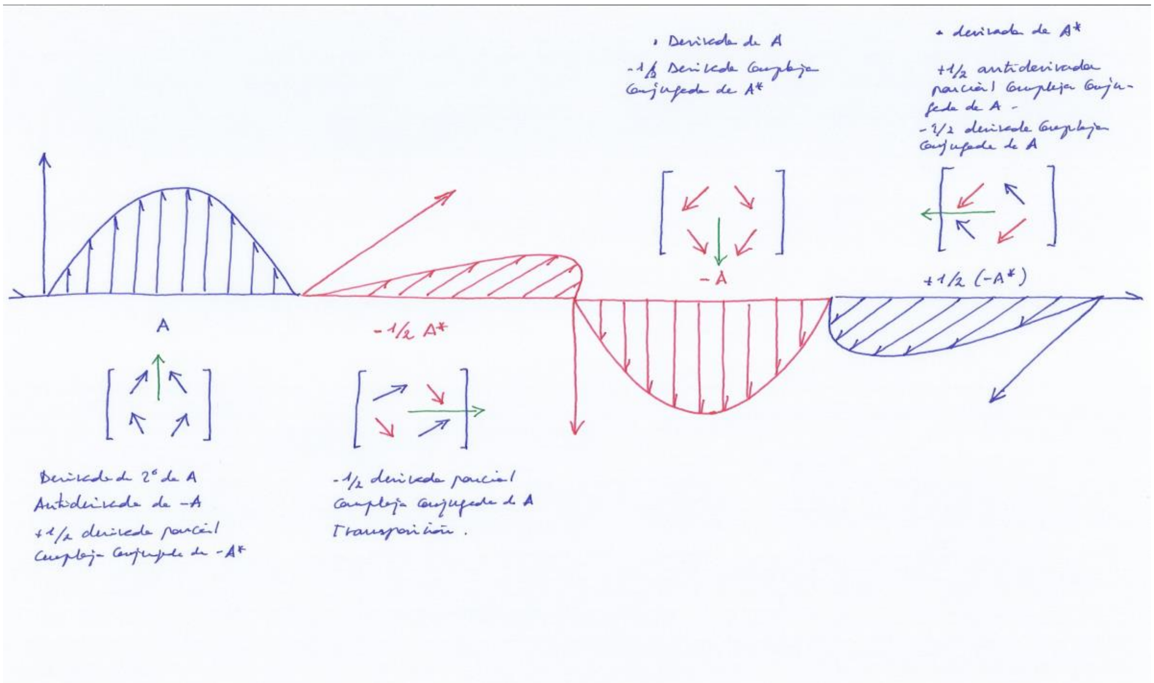
It also could be thought that the function A could be integrated with the –½ part of the partial complex conjugate derivatives Acc and -Acc, and that -A could be integrated by the +½ part of both partial complex conjugate derivatives.



But what is fundamental is to be aware that removing from the differential equation the complex conjugate derivatives, or the derivative of any variable, the given description will be only of ½ of the complex system.

Each partial derivative will depend on the transformation of the previous partial derivative, and the integer derivatives will depend on the previous partial derivatives; all the variables, the 2x2 matrix elements, are in this way interconnected.

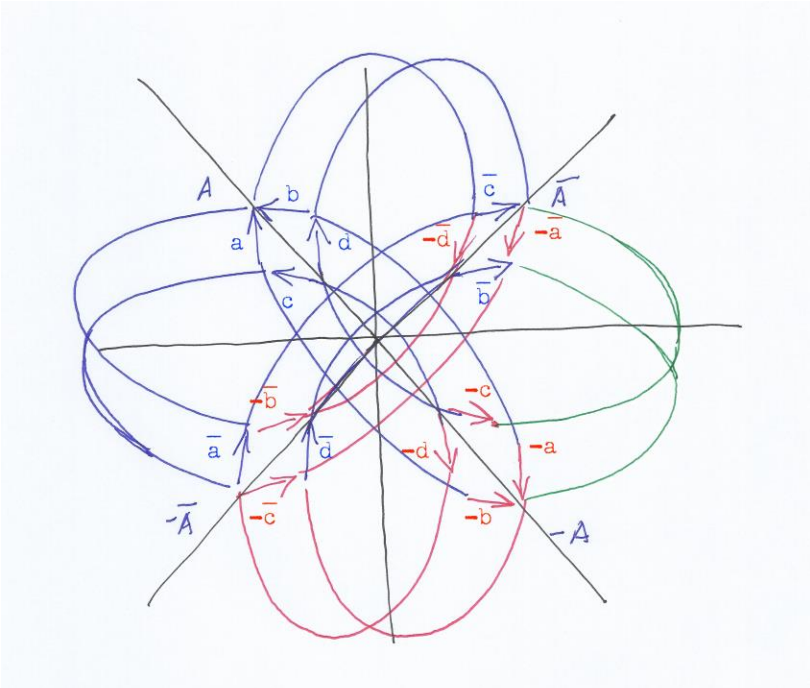
If we represent the sequential evolution of the system in a linear way, it would be something like this:



It can be easily recognized on the above figure the classic representation of an electromagnetic wave, but here the "electric field" (on the Y coordinate) and the "magnetic field" (on the X coordinate) are not different spaces that are perpendicular nor conjugate, they are the same space that evolves through time, experiencing an orthogonal upward displacement of energy and mass on A, then a horizontal right handed displacement on A complex conjugate, then an orthogonal downward displacement on -A, and then a horizontal left handed displacement on -A complex conjugate, while completing a 270 degrees rotation.

Why do the classical EM fields experience such displacements? Are we sure the electromagnetic wave is formed by two interacting waves or is it a same wave evolving through time? Does the electromagnetic wave rotate?

A different attempt to represent the related complex functions would be this diagram:

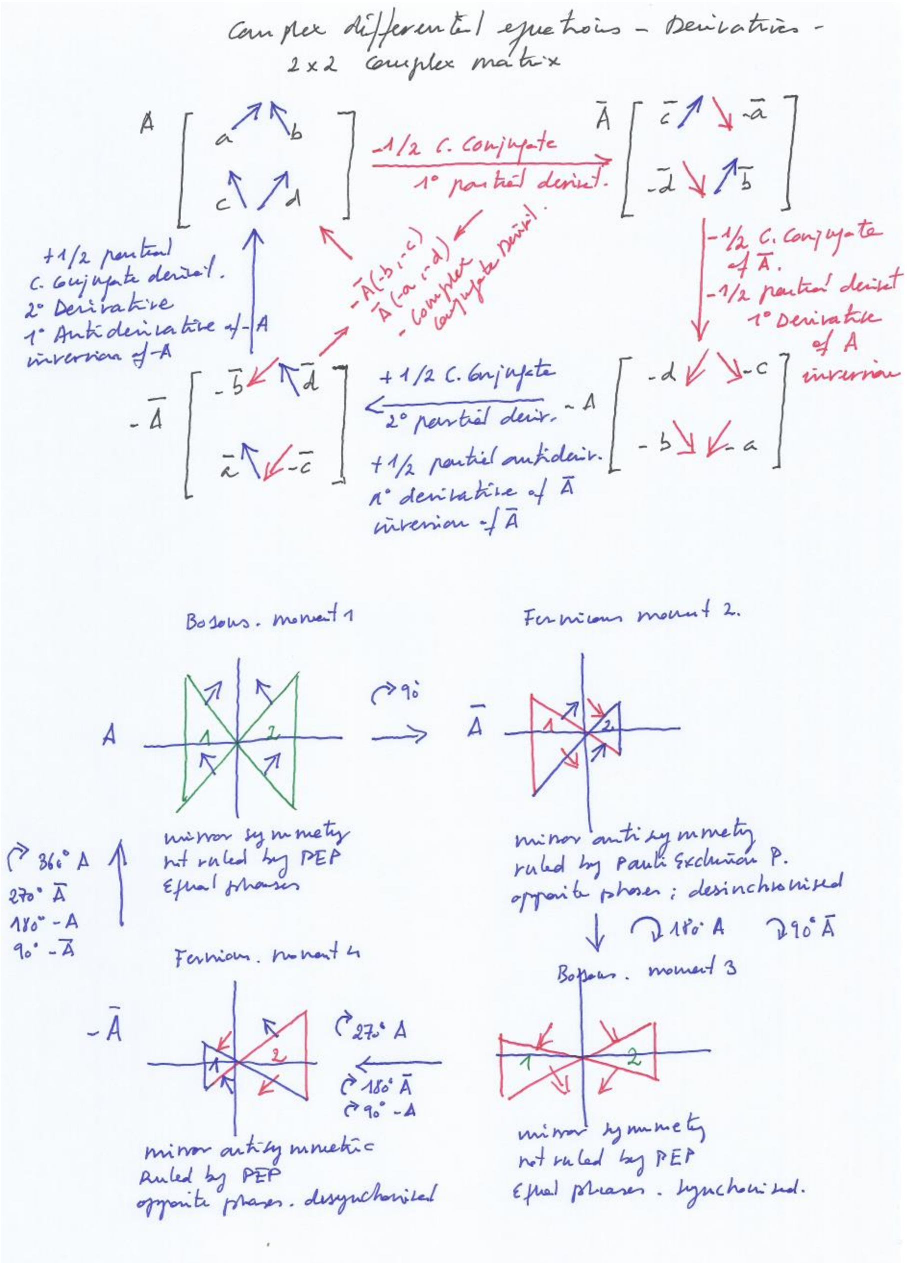


Some points where the functions intersect as –b and b cc. or –c and b cc. would be equal zero. In this sense the differential equation could be thought as a Riemann Z function where the zero points, where the vectors or numbers are not divisible would indicate a prime number, placed near a critical strip formed by the real X axis.

The functions would be holomorphic except in some points near the "critical line", specially at one pole of the differential equation where they would be meromorphic, non-complex differentiable.

At this respect it could be interesting to realize that the –½ A complex conjugate derivative of 1 order and the -½ -A complex conjugate derivative of 2 order will form an integer complex conjugate derivative with respect to A.

But that possibility will not work for –A (which is one of the poles of the differential equation) because the +½ -A complex conjugate derivative is of a higher order than –A. So, there's not option of forming an integer + complex conjugate derivative with Acc and –Acc for –A.



The Schrodinger equation is a partial differential equation of second degree, which implies it does not combine all its derivatives; or it uses the derivatives of a part of the variables.

Being of second order, it's thought that it offers a separate complex conjugate alternative equation:

Fermions and bosons, have been developed by quantum mechanics as two different kinds of unrelated spaces or particles. The complex Schrodinger function probabilistically describes the mirror symmetric bosonic particles with integer spin not ruled by the Pauli Exclusion principle, while its alternative complex conjugate function probabilistically describes the mirror antisymmetric fermionic particles with 1/2 spin, ruled by the Pauli Exclusion principle.

But the 2x2 matrix derivatives shows that the complex conjugate equation is not an independent equation, it's a part of the whole complex equation, and removing one of its derivatives or one of its variables, the picture will be incomplete.

The complex matrix derivations show that combining all the partial derivatives on a complex differential function, bosons and fermions would be the same topological spaces being transformed through time when synchronising and desynchronising their phases of variation while the nucleus rotates.

The periodical transformations of bosons in to fermions and vice versa would occur by means of each partial complex conjugate derivative of the previous variation.

Each permutation causes a change on ½ of the rotational system.

In this sense, the nuclear spaces will act as fermions after being –½ transformed by the complex conjugate partial derivative of A, or +½ transformed by the complex conjugate partial derivative of -A. That explains why fermions have ½ spin.

Those same spaces will act as fermions when the successive ½ derivatives complete a whole derivative, of first order in the case of –A or of second order in the case of A.

A periodic alternation between imaginary and real partial derivatives will occur.

The problem of discontinuity that breaks with the classical notion of wave continuity, underlaying the notion of "quantum" and so the discrete states of the atomic particles would be then caused by the rotation of the atomic nucleus.

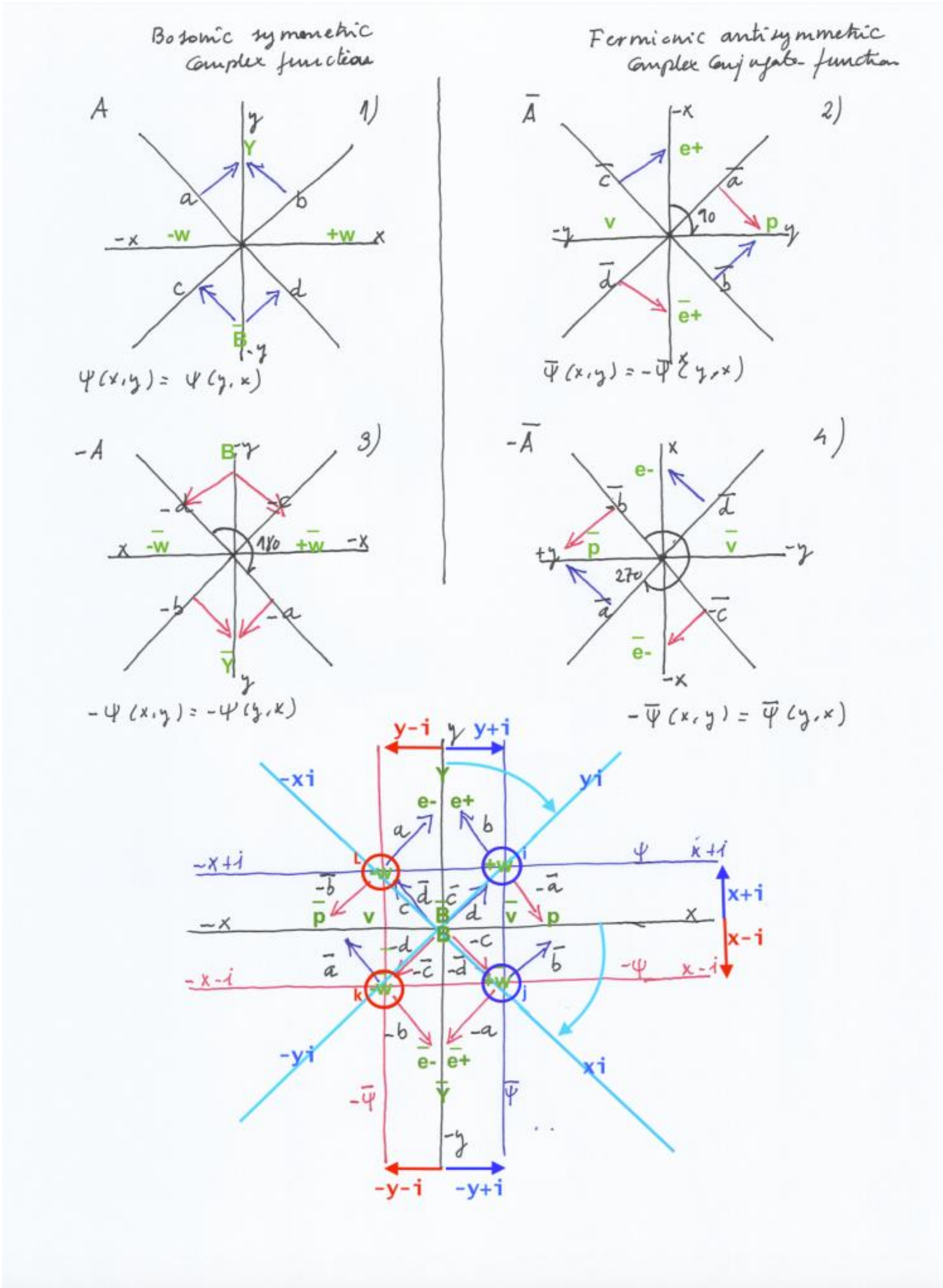
With a traditional notion of wave, for example a longitudinal wave that expands and contracts, the expanding state withs a shorter amplitude will be followed by its inverse contracting space and a higher amplitude, and the function that describes those states will be continuous.

But here the simultaneous contracting states of the two-mirror bosonic transversal spaces will be followed by the "retarded" contracting state of one the transversal spaces and the "advanced" expanding state of its mirror space, becoming fermions both spaces. The two antisymmetric fermionic states will be again transformed into two symmetric bosonic states after a new permutation where the transversal spaces simultaneously contract, and so on to complete a 360 degrees rotation where the energy and the physics of the nuclear system remains invariable.

If the matrix A is the function that describes the contracting state of both mirror symmetric bosons with the increasing system's energy moving up, its –½ complex conjugate will describe the system as two mirror antisymmetric fermions with the system's energy moving towards right; the –½ complex conjugate of Ac. conjugate will describe the system as two contracting bosons and a decay of energy moving down; -A, will be the integer derivative of first order of the initial A; and the +½ complex conjugate derivative of –A will describe the system as two antisymmetric fermions with the system's energy moving left. -Ac. conjugate will be the –½ antiderivative of –A and the integer complex derivative of Ac. Conjugate. A final permutation will let come back to the initial state where the two bosonic transversal spaces simultaneously contract. A will be its second-degree derivative, and the first antiderivative of –A.

A wave function that does not use the whole 4 variables of the system or that does not consider all the partial derivatives of it as it will be the case of a partial differential function, cannot enterely describe a rotational model of this type.

If we mapped on a same space simultaneously the different vector status and quantum particles given by the functions that represent different successive moments of time, we see that the whole system is symmetric. Being a symmetry reached through time, it can be said the nucleus is supersymmetric.



Supersymmetric particles, that should link the separate types of fermionic and bosonic particles, have been predicted by mainstream models and looked for particle accelerators. But considering the forgotten mirror symmetric part of the nucleus no new supersymmetric particles are needed.

Looking at the diagram, bosons appear on the imaginary points, and fermions on the real ones. They are imaginary or real for us because we are looking the system from a real point of view given by the non-rotated XY coordinates. But considering A is placed on a real coordinate, then bosons will be on the real points will fermions will be on the complex conjugate or imaginary points. It will depend on our referential frame.

It also can be seen that to superpose all of the successive status of the atomic nucleus simultaneously it's necessary to add two X coordinates displaced to a projected + or - imaginary point as X+i and a X-i coordinates. The same will be necessary with Y-I and Y+i .

X+i and Y-i will represent an expansion of the real space, while X-i and Y+i will represent a spatial contraction. That is a consequence of the up down and left right movements of the nucleus while rotating.

Keeping fixed XY coordinates, and creating a complex system by rotating the Z coordinates that introduce the imaginary part, implies an expansion or a contraction of the represented space.

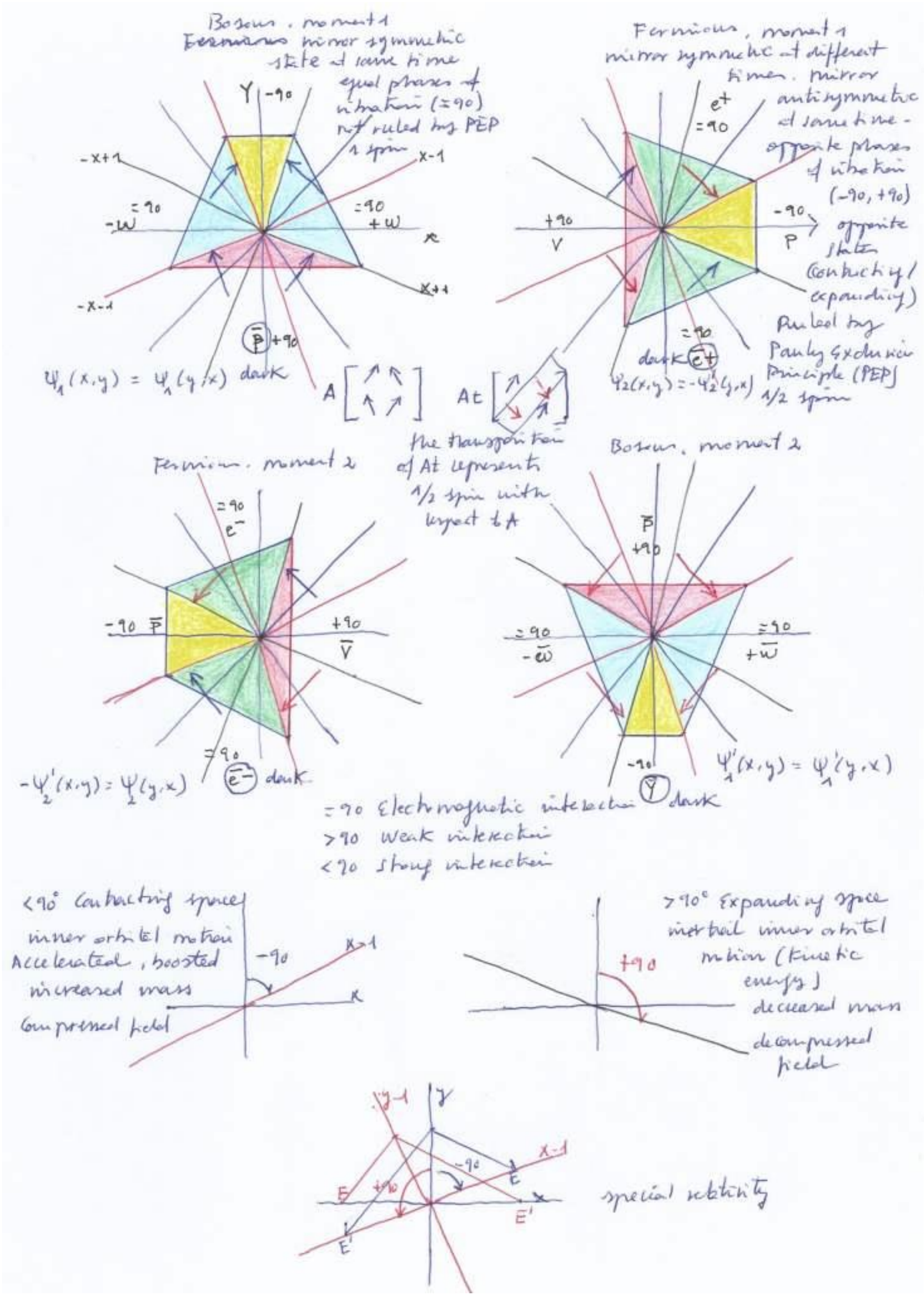


Figure: rotating atomic nucleus

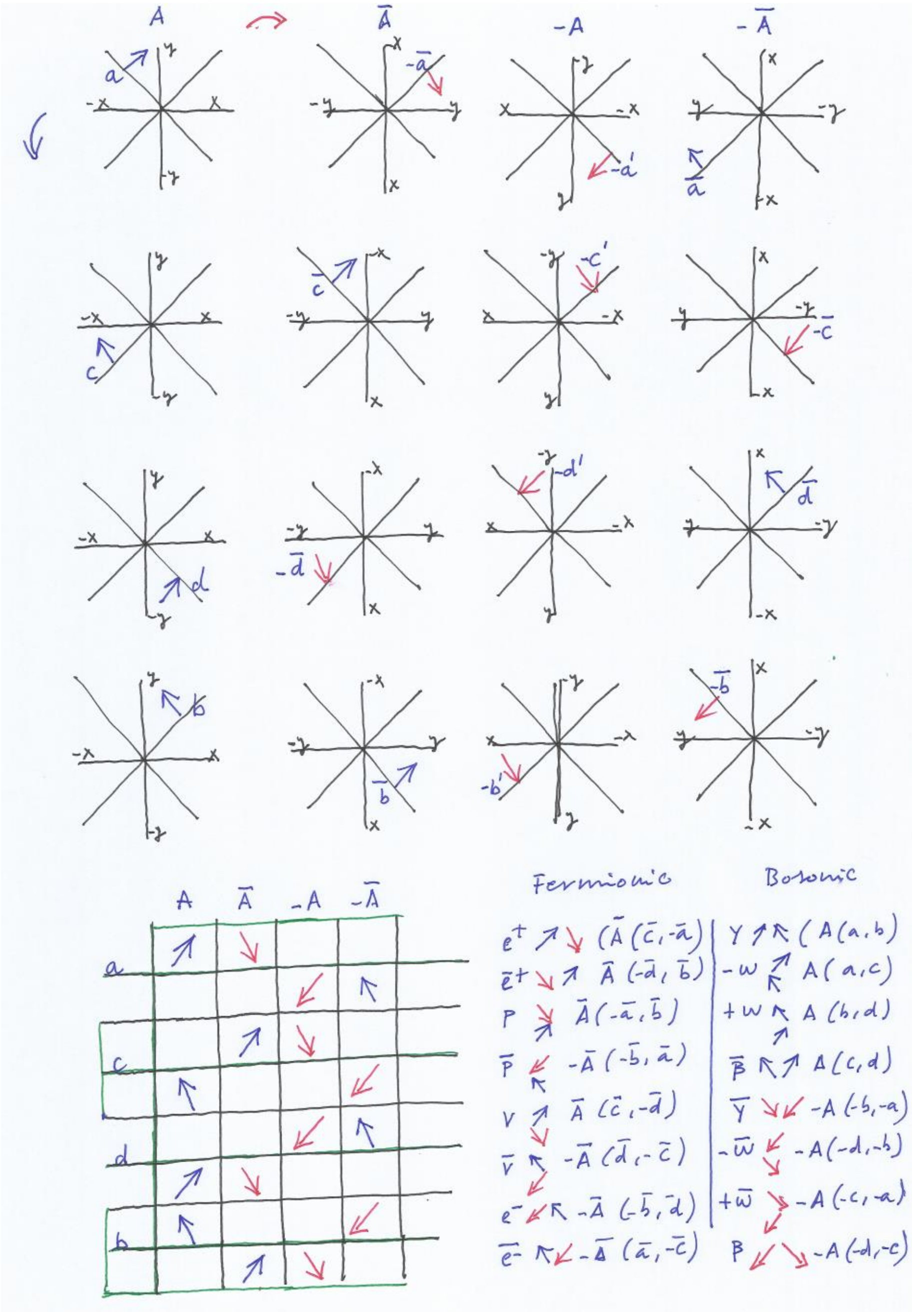


Figure: separate view of the derivatives of each variable, and 16 groups of symmetry of pair vectors related to the subatomic particles. Each Z permutation implies a partial complex conjugate derivative of the previous state.

This rotational nuclear model is part of a broader dual atomic model where the atom is thought as a dual system of two intersecting spaces vibrating with same or opposite phases with a shared nucleus of 2 orthogonal and 2 transversal subspaces vibrating with same or opposite phases that synchronise and desynchronise periodically.

The vectors would represent the forces of pressure o decompression caused by the intersecting spaces while expanding or contracting.

In this sense, two converging vectors will indicate a contracting space that will experience a double force of compression with an inward pushing force that will boost its increasing inner kinetical orbital energy and so it will increment its mass.

Two diverging vectors will indicate an expanding space experiencing a double decompression causing an outward pushing force, and having a decreasing inner kinetic energy and a decremental mass.

An upward and a downward vector pointing towards the same direction will indicate an electromagnetic space moving right or left.

Between each contraction and expansion, until the next expansion or contraction, the inner kinetic motions will be inertial all cases.

In a QCD context, these vectors that carry the pushing forces could be identified as ¨quarks¨.

The strong interaction of the system will be given by the inner orbital motion of the doubly contracting subspaces, the weak interaction by the inner orbital motion of the doubly expanding subspaces, and the EM interaction by the forces of pressure caused by the electron-positron subspace when moving left to right and vice versa.

From the rotatory nucleus it seems the nuclear spaces would synchronise or desynchronise their phases of vibration by means of the transformations caused by the nuclear rotation itself.

The visual geometric atomic model can be related to the matrix model in this way:

The A matrix represents a transversal space determined by ac, and its mirror symmetric space determined by bd, and two orthogonal spaces determined bb ab and cd respectively.

The ac and bd transversal spaces will be –w and +w bosons, having mirror symmetry at the same moment, as their phases are synchronised (emitting a photon the upward orthogonal space).

The picture given by A would be the state where the highest level of expansion of ac and bd is reached, being the + limit of the function that represents the bosonic variation of the nuclear system.

The quantum states given at a future moment at the integer derivative –A matrix will represent the – limit of that function, when both transversal spaces will be the antisymmetric –w* and +w* spaces represented now by -db and -ca, reaching their highest level of contraction (being the orthogonal space the downward space that will experience a decay).

But if the fermionic states are intercalated between the two bosonic states by means of the –½ and +½ partial conjugate derivatives of a and –A respectively, two additional limits must be added to the function.

In thi sense -½ Acc will represent the moment where the left transversal space reaches its highest level of expansion acting as a neutrino and the right transversal space reaches its highest degree of contraction acting as a proton, (being the orthogonal space moving right a Majorana positron), while +½ Acc will represent the contrary case where the left transversal space reaches its highest level of contraction acting as an antiproton and the right transversal space reaches its highest degree of expansion acting as an antineutrino (being the orthogonal space a moving left Majorana electron).

The transversal spaces would be extradimensional because their real Y coordinate will be interpreted as a complex coordinate from the point of view of the real intersecting spaces.

Also, the antisymmetric phases of fermions could be interpreted as two-time dimensions that converge into one when being transformed in to bosons, and diverge in to two when being transformed in to fermions.

It seems the geometry of the transversal spaces will be related to Lobachevsky's geometry.

If the plank constant appears when comparing the wave length and the kinetic energy of the nuclear spaces, being similar 2Pi, which appears when relating the diameter and the perimeter of a circle. Maybe the slightly different between both constants could be caused by the half hyperbolic geometry of the transversal spaces.

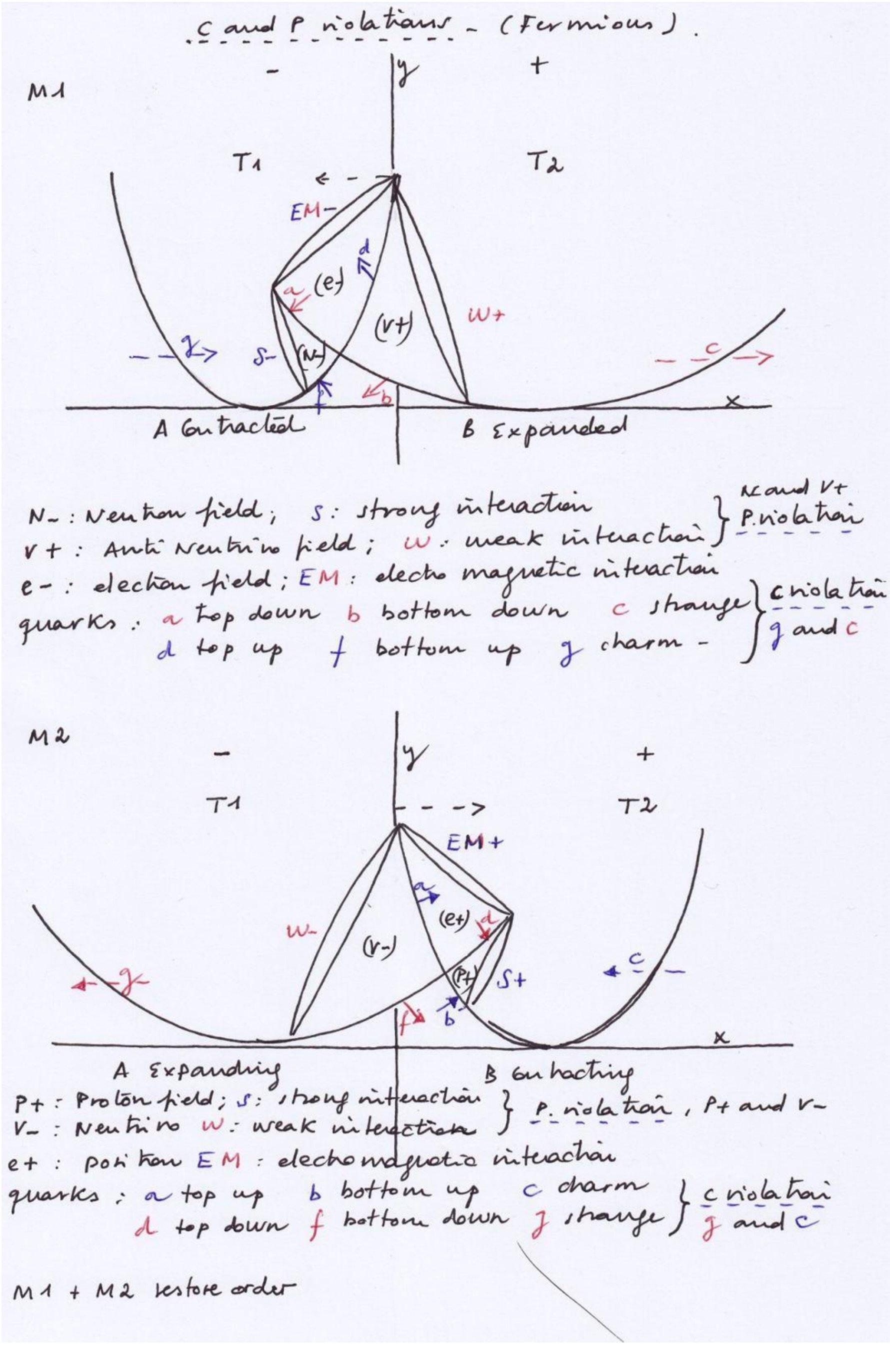
On the other hand, I think the -1/2 partial complex conjugate derivatives of A (Acc and -A), and the +1/2 partial complex antiderivatives of -A (-Acc and A) can also be thought in terms of Fourier transforms, discrete Fourier transforms, and Fourier series.

In that context, the -1/2 complex conjugate derivative Acc would be the Fourier transform of A.

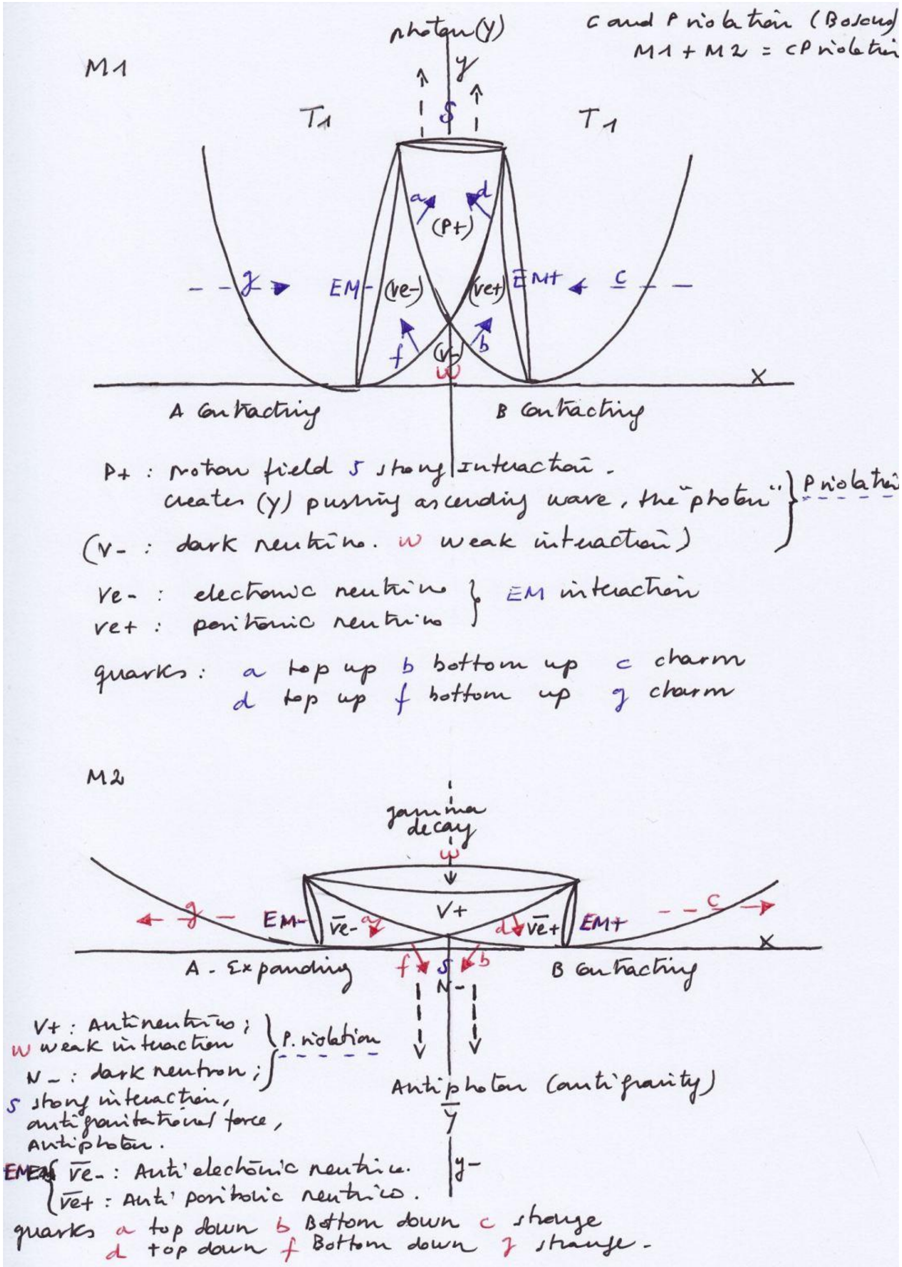
Performing a triple Fourier transform, a triple partial complex conjugate derivative of A (-1/2Acc + -1/2-A + 1/2-A) we get the +½ -Acc derivative that would be an inverse Fourier.

A discrete time Fourier transform produces, from uniformly spaced samples, a function of frequency that is a periodic summation of the continuous Fourier transform of the original continuous function.

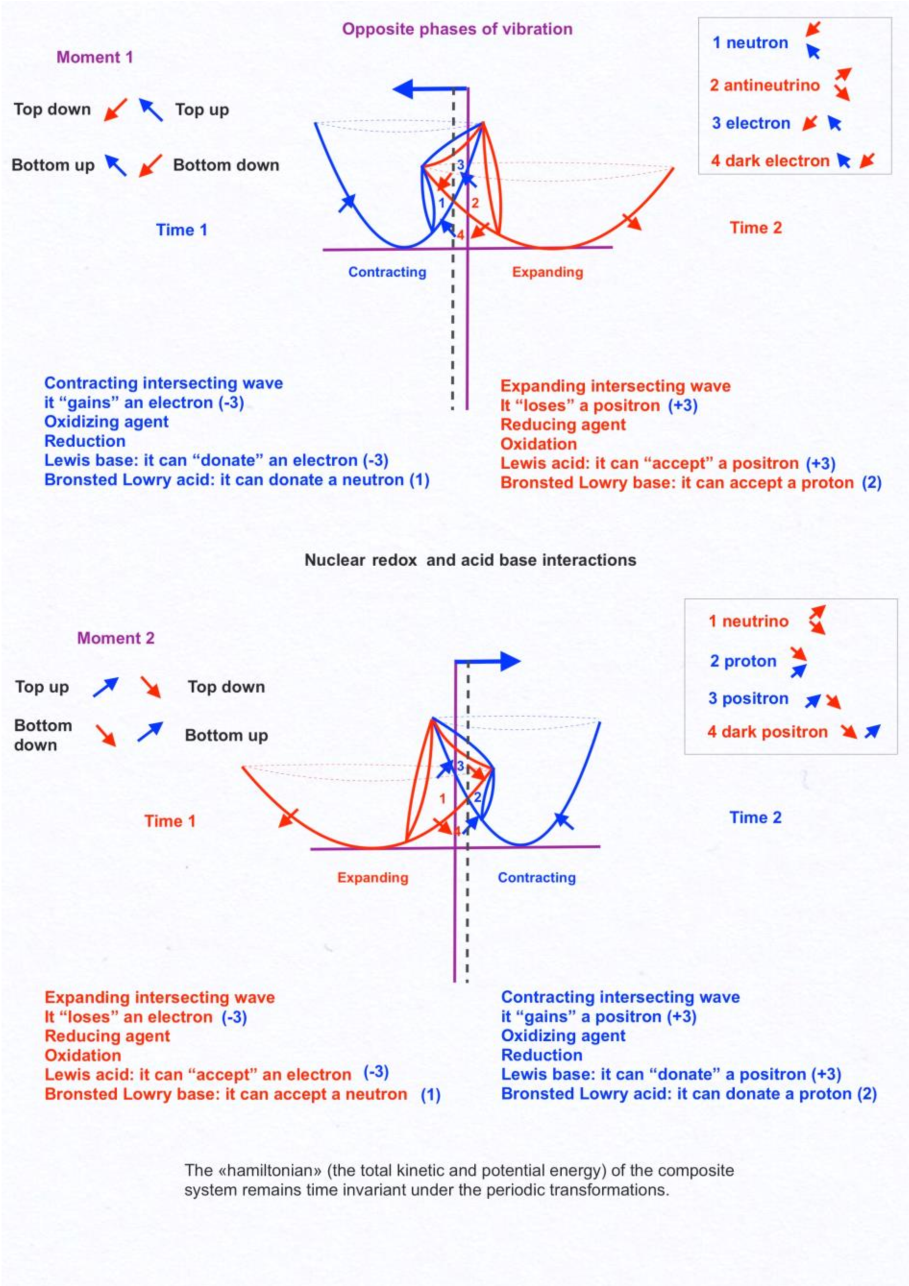
The addition of all the partial complex conjugate derivatives would be a Fourier series, where we combine two functions with different frequencies, the symmetric function A,-A and its complex conjugate solution, the antisymmetric function Acc,-Acc.



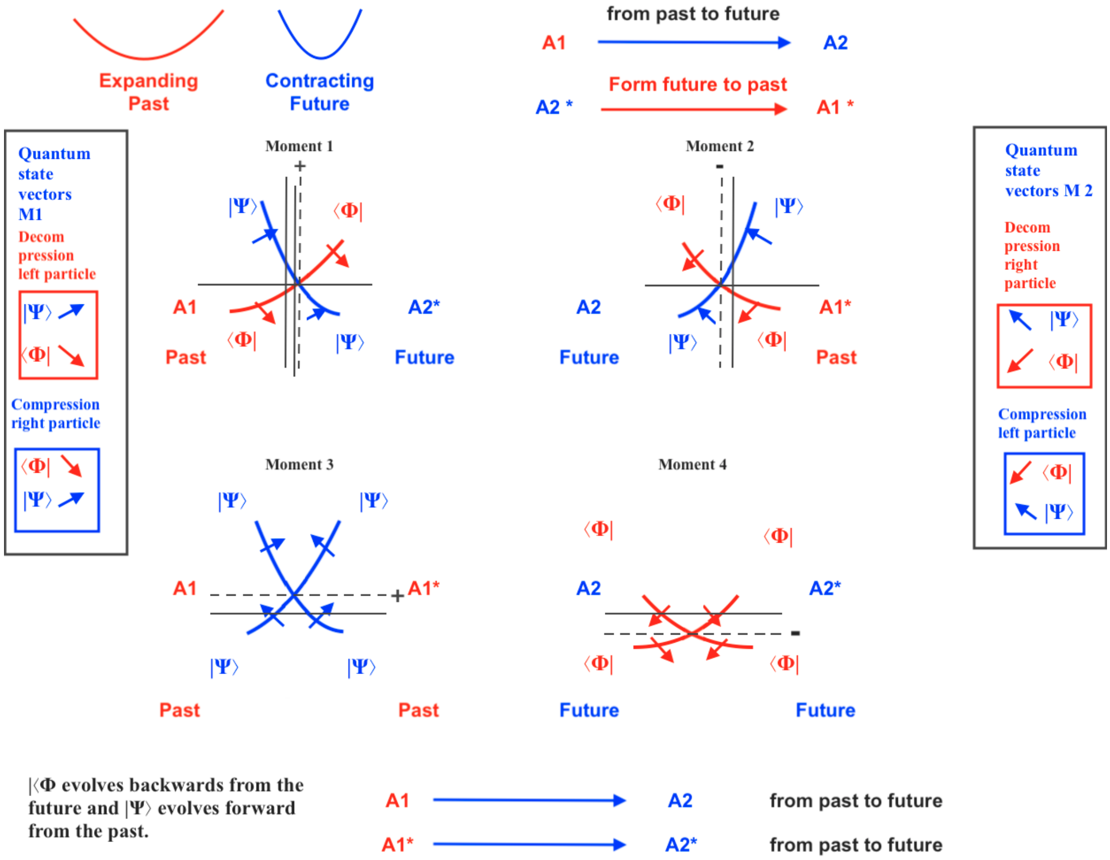
Opposite phases of vibration, fermions



Equal phases of vibration, bosons.



Subatomic interactions as Redox or Acid base reactions



Another way of considering the model related to Feynman Wheeler "handshake" theory

Copernicus questioned the geocentric model because of its unexplained asymmetries and extreme complexity. In the preamble of the "De Revolutionibus" he explained that the ancient model seemed to be a kind of monstrous sculpture formed by the unrelated members of very different creatures.

Our current solar system model, being apparently simple, is also full of unexplained asymmetries: each orbital planet has a different eccentricity, a different inclination, different velocities that accelerate and decelerate periodically, and even some planets rotate around their centre in an opposite direction.

The Newtonian mechanics nor the Einstein gravitational model provide a unique explanation that mechanically explain the detected asymmetries of the system. They are only mathematically justified.

Undoubtedly, Copernicus todays would also question the heliocentric model whose asymmetries where unknown for him, and maybe he would come again to the ancient Greek's sources where the notion of mirror symmetry and anti-symmetry already appeared in the cosmological models where Antichton, the forgotten Anti-Earth, was already considered. They also considered they idea of a dual system in the concept of a central fire additional to our sun. And maybe, knowing the Riemann geometry of intersecting manifolds and submanifolds, he would find enough clues to consistently review the already old heliocentric model. At least until new unexplained inconsistencies appeared.

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