

Note

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About the Atom Vector Model

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Short presentation

Based on the analysis of the electron's electric field in classical representation we can imagine a sketch of the Bohr model, where the double helix of the magnetic field plays an essential role. The step of helix is assimilated with wavelength associated with Rydberg constant [1] (Fig.1 and Fig.2).

Furthermore, we make the transition to more elaborate atomic models (Bohr → de Broglie → Sommerfeld), [2-7] in a suggestive way, the helical magnetic field being present in all these models (Fig. 3).

Obviously, the electromagnetic field lines ubiquitous in the universe, which was defined by a sense of movement associated with speed c , is an essential element of these models [8]. Particles, in this case the electron and proton (nucleus) are, in the author's acceptance and other researchers [9], [10], constructions under the form of nodes where electric charge has a fundamental role [11].

From Sommerfeld's model (with the amendment of Schrodinger's theory, where $L = \sqrt{\ell(\ell+1)}\hbar$, ($\ell = 0, 1, 2, \dots n-1$) and not $L = n\hbar$) we can move to the orbital angular momentum diagram, a new concept, where the atomic nucleus can have specified position (Fig. 4).

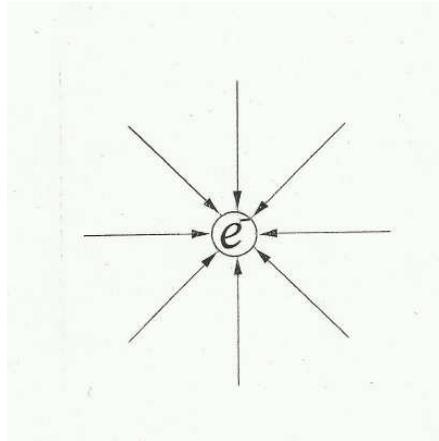
Considering the conditions of symmetry of the atomic nucleus in the case of orbital motion and spin radial motion (round trip), actually a double internal twist, the orbital angular momentum and the spin angular momentum were redesigned (Fig. 5).

Fig.6 shows the total angular momentum vector, which is reflected in the double twist of geometric construction to spin and symmetry of the atomic nucleus.

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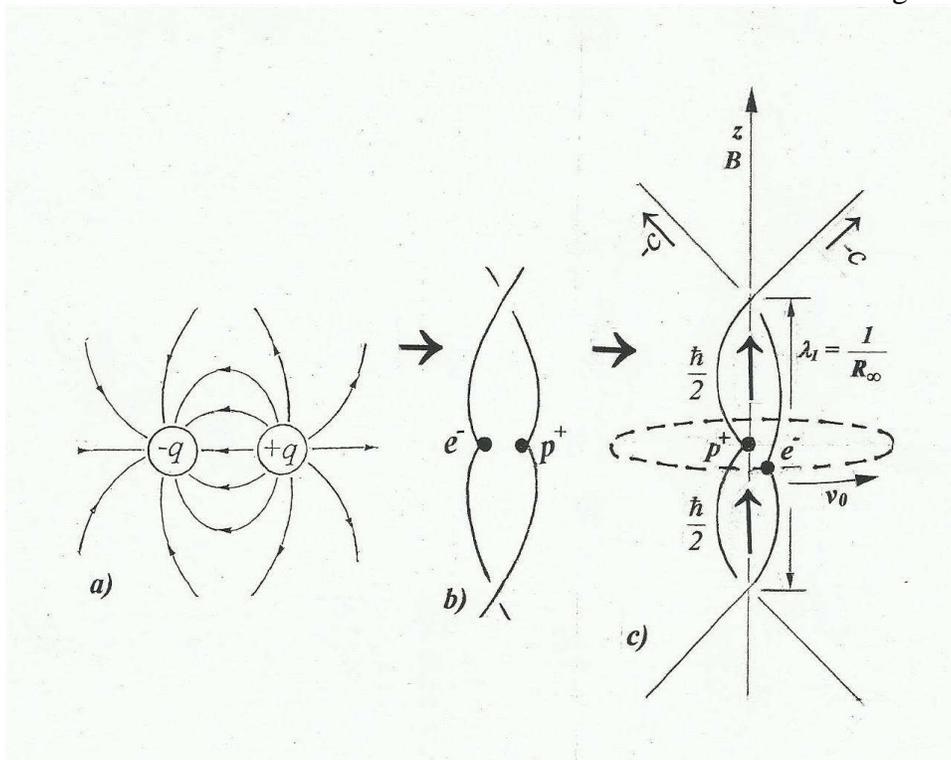
Fig.1



Wrong classical representation of the electric field of the electron. To characterize each point in space around the electron using an infinite number of field lines whose field strength is proportional to density. Thus, we have 2∞ lines for $2e^-$, 3∞ lines for $3e^-$, ... $n\infty$ lines for ne^- (charge quantization).

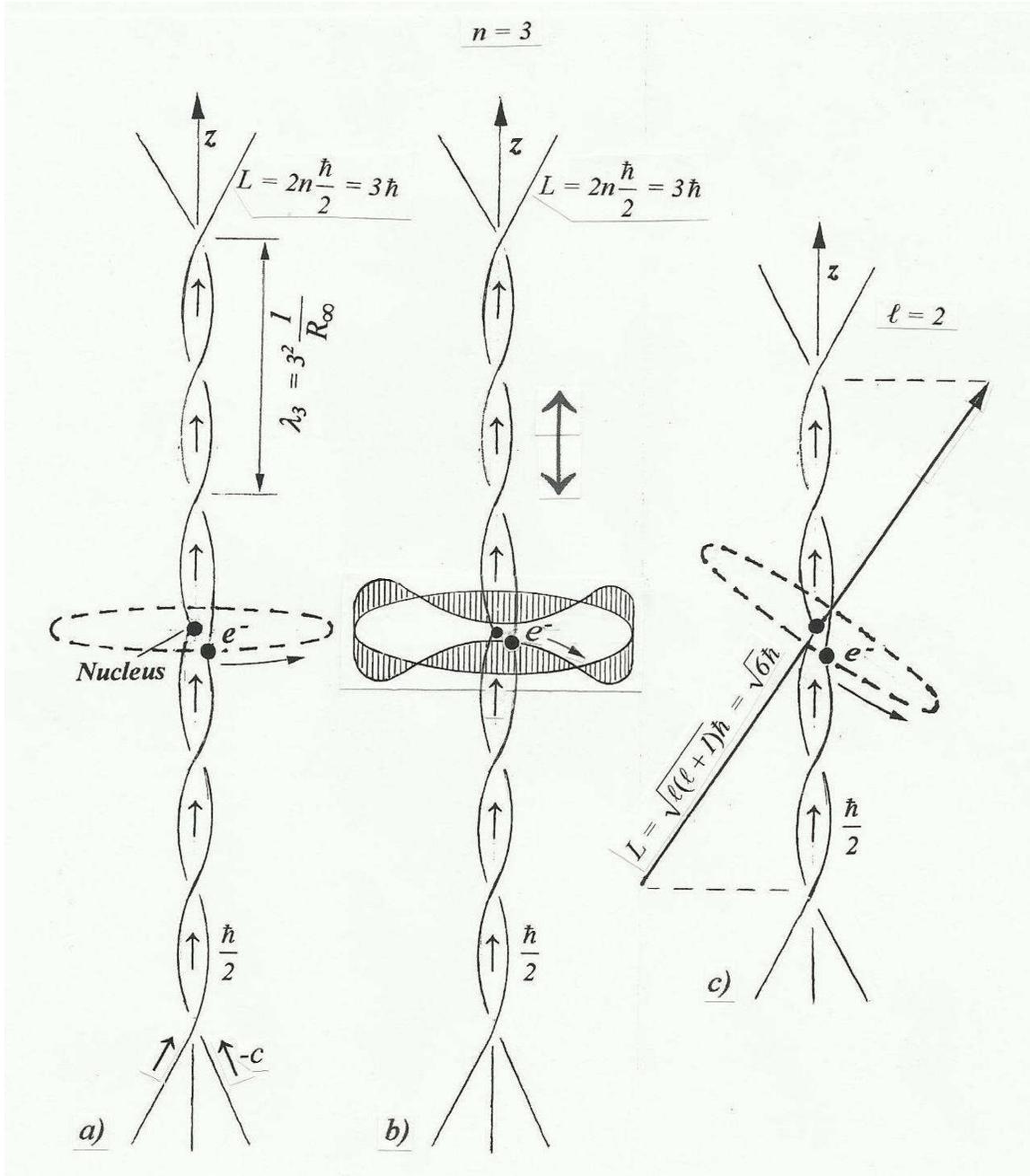
But series $\infty, 2\infty, 3\infty, \dots n\infty$ is meaningless. They can not characterize the electric field density between the two terms because these lines $(n-1)\infty$ and $n\infty$ shows no difference.

Fig.2



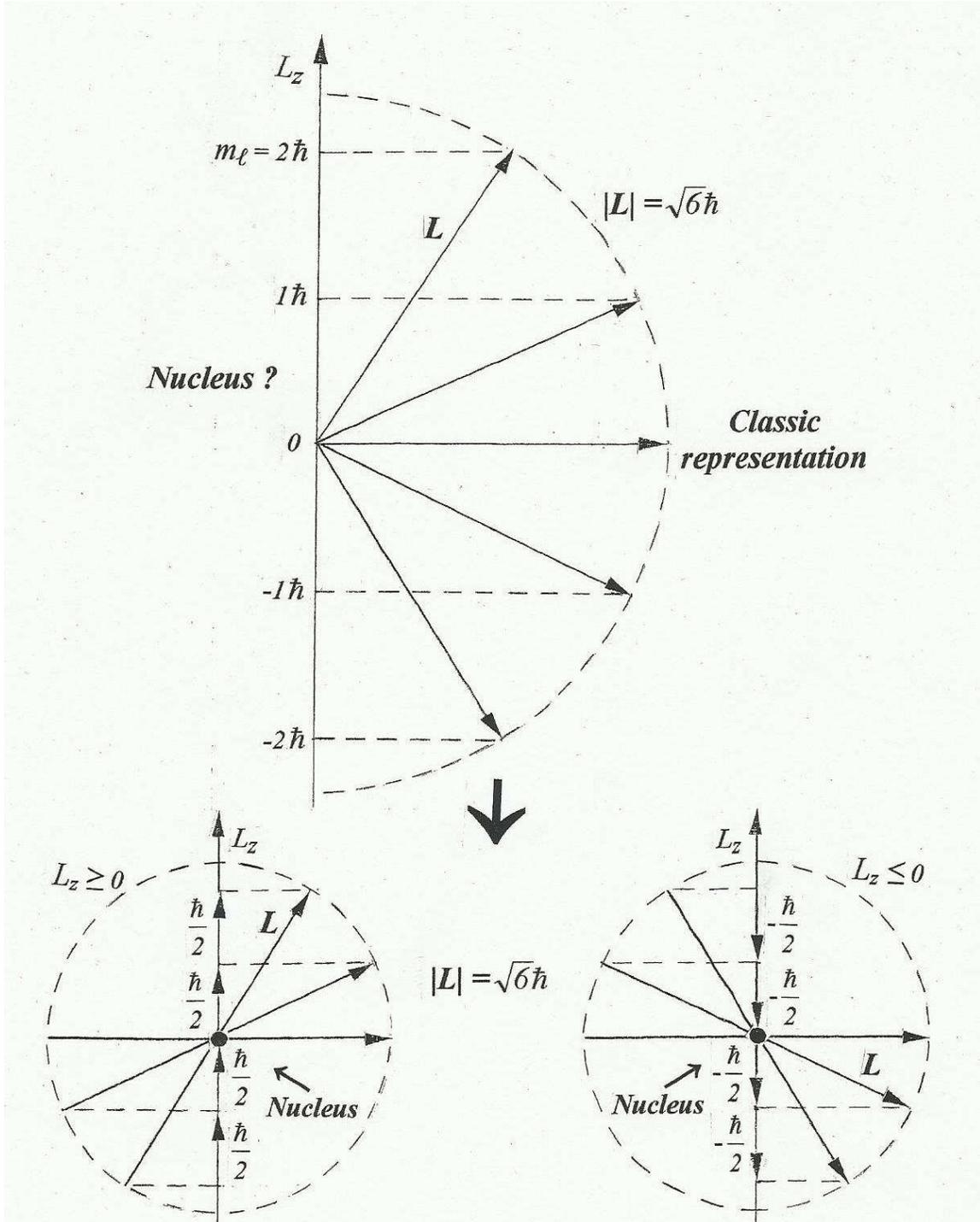
From electrostatics to the Bohr's theory: a), b), c) sequences (author's interpretation)

Fig.3



Bohr, a), de Broglie, b), Sommerfeld, c), theory (author's interpretation).

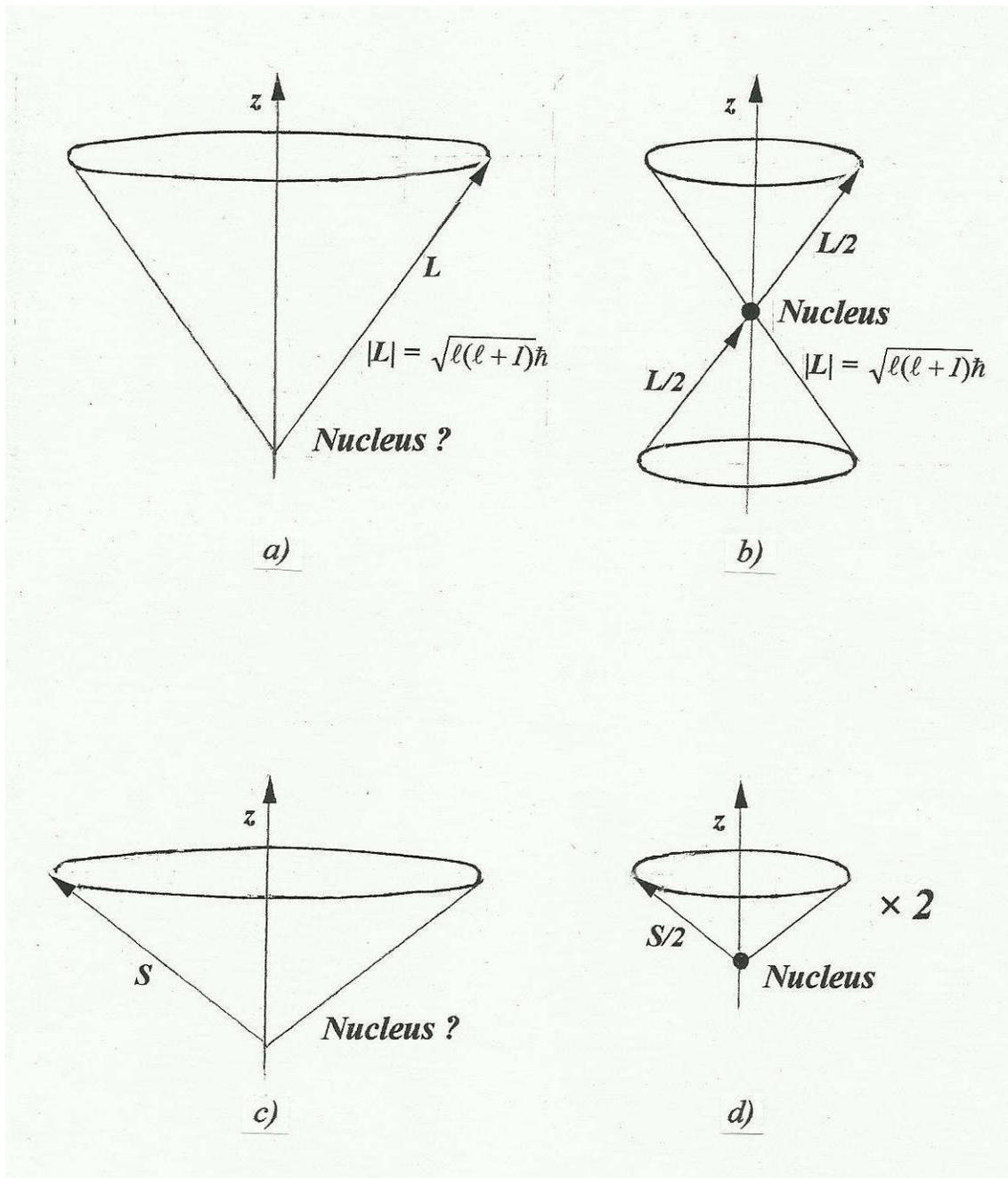
Fig.4



The hydrogen atom: correct vector diagram of the orbital angular momentum, $n=3$, $\ell=2$.

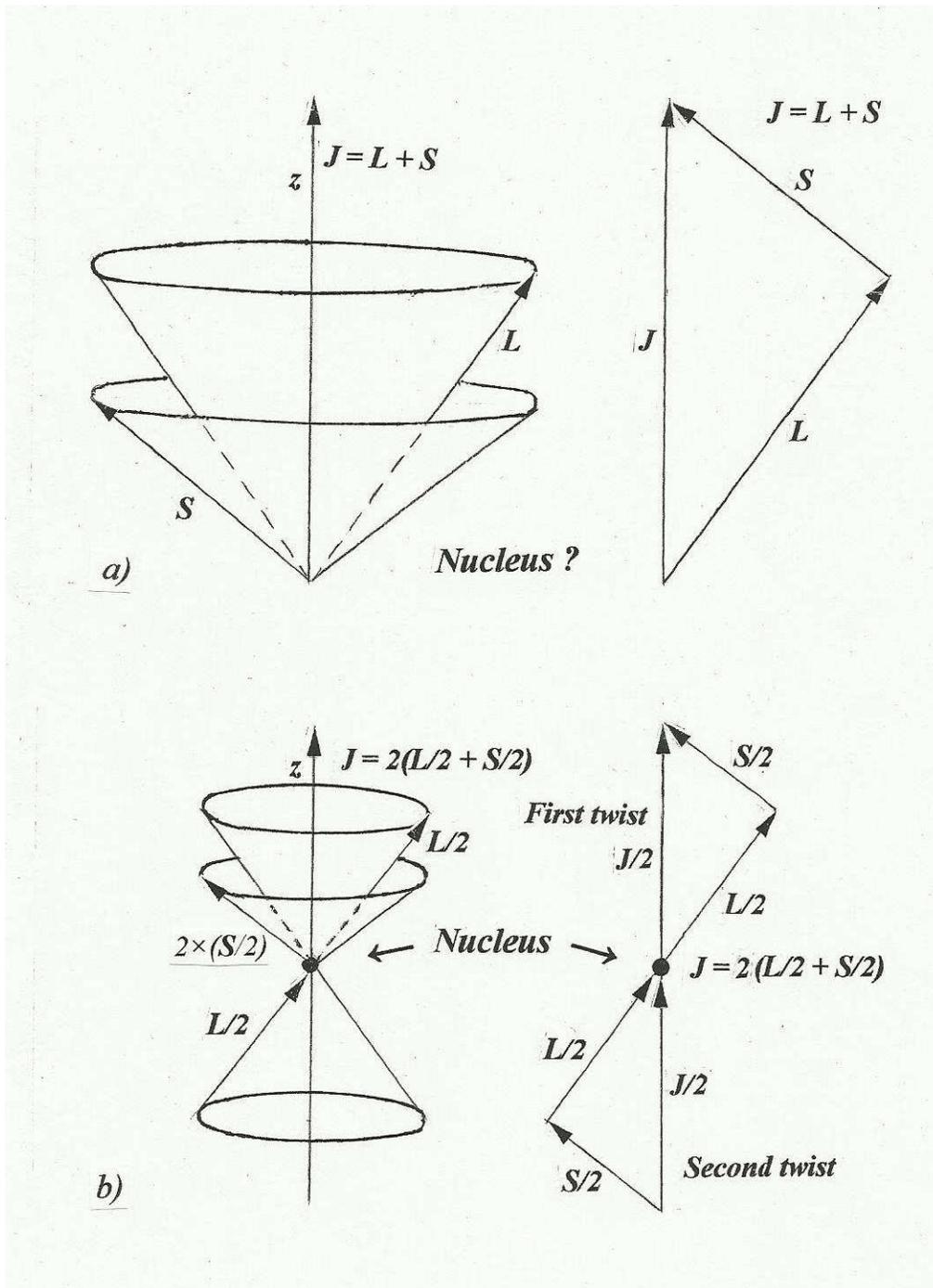
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Fig.5



Vector model for angular momentum of the electron: a) Orbital angular momentum, classic; b) Orbital angular momentum in the author's interpretation; c) Spin angular momentum, classic, for a internal rotation of 720° ; d) Spin angular momentum, a half twist of 720° , reflecting double internal rotation of the spin (author's interpretation).

Fig.6



Vector model for total angular momentum: a) Classical representation; b) New representation, highlighting internal double twist and symmetry from the nucleus.