Mysteriously disappearing valence electrons of rare Earth metals and hierarchy of Planck constants

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Abstract

The so called Lifshitz transition in which the heating of rare earth metal leads to a mysterious disappearance of some valence electrons is a longstanding puzzle of atomic physics. The identification of dark matter as phases of ordinary matter with non-standard value $h_{eff}h = n \times h$ of Planck constant suggests an explanation in terms thermally induced transitions of valence electrons to dark states with smaller binding energy proportional to $1/n^2$. This could be achieved also by irradiation. If this is true, an entire spectroscopy of dark atoms is waiting to be discovered. Also biologically important ions proposed to be dark could be dark atoms in the sense that some valence electrons are dark.

1 Introduction

The evidence for the hierarchy of Planck constants $h_{eff}/h = n$ labelling dark matter as phases with non-standard value of Planck constant [K3] is accumulating. The latest piece of evidence for the hierarchy of Planck constants comes from the well-known mystery (not to me until now!) related to rare Earth metals. Some valence electrons of these atoms mystically "disappear" when the atom is heated. This transition is known as Lifshitz transition. The popular article "*Where did those electrons go? Decades-old mystery solved*" (seehttp://tinyurl.com/ychzjg8d) claims that the mystery of disappearing valence electrons is finally resolved. The popular article is inspired by the article "*Lifshitz transition from valence fluctuations in YbAl3*" by Chatterjee et al published in Nature Communications [D1] (see http://tinyurl.com/ybejzq87).

The mysterious disappearance of valence electrons brings in mind dark atoms with Planck constant $h_{eff} = n \times h$. Dark matter corresponds in TGD Universe to a hierarchy with levels labelled by the value of h_{eff}. One prediction is that the binding energy of dark atom is proportional to $1/h_{eff}^2$ and thus behaves like $1/n^2$ and decreases with n.

$n = 1$ is the first guess for ordinary atoms but just a guess. The claim of Randell Mills is that hydrogen has exotic ground states with larger binding energy. A closer examination suggests $n = n_0 = 6$ for ordinary states of atoms. The exotic states would have $n < 6$ and therefore higher binding energy scale [L1, L2] (see http://tinyurl.com/goruuzm and http://tinyurl.com/y7sc98lz).

This leads to a model of biocatalysis in which reacting molecules contain dark hydrogen atoms with non-standard value of n larger than usual so that their binding energy is lower. When dark atom or electron becomes ordinary binding energy is liberated and can kick molecules over the potential wall otherwise preventing the reaction to occur. After that the energy is returned and the atom becomes dark again. Dark atoms would be catalytic switches. Metabolic energy feed would take care of creating the dark states. In fact, $h_{eff}/h = n$ serves as a kind of intelligence quotient for a system in TGD inspired theory of consciousness.

Could the heating of the rare earth atoms transform some valence electrons to dark electrons with $h_{eff}/h = n$ larger than for ordinary atom? The natural guess is that thermal energy kicks the valence electron to a dark orbital with a smaller binding energy? The prediction is that there should be critical temperatures behaving like $T_{cr} = T_0(1-n_0^2/n^2)$. Also transitions between different dark states are possible. These transitions might be also induced by irradiating the atom with photons with the transition energy between different dark states having same quantum numbers.

2 About possible implications

The proposed explanation of the disappearing valence electrons allows to sharpen the hypothesis for dark ions. Actually dark atoms with some dark valence electrons would be in question.

2.1 ORMEs as one manner to end up with $h_{eff}/h = n$ hypothesis

I ended up to the discovery of dark matter hierarchy and eventually to adelic physics [L3], where $h_{eff}/h = n$ has number theoretic interpretation along several roads starting from anomalous findings. One of these roads began from the claim about the existence of strange form of matter by David Hudson. Hudson associated with these strange materials several names: White Gold, monoatomic elements, and ORMEs (orbitally re-arranged metallic elements). Any colleague without suicidical tendencies would of course refuse to touch anything like White Gold even with a 10 meter long pole but I had nothing to lose anymore.

My question was how to explain these elements if they are actually real [K1, K2]. If all valence electrons of this kind of element are dark these element have effectively full electron shells as far as ordinary electrons are considered and behave like noble gases with charge in short scales and do not form molecules. Therefore "monoatomic element" is justified. Of course, only the electrons in the outermost shell could be dark and in this case the element would behave chemically and also look like an atom with smaller atomic number Z. So called Rydberg atoms for which valence electrons are believed to reside at very large orbitals could be actually dark atoms in the proposed sense.

Obviously also ORME is an appropriate term since some valence electrons have re-arranged orbitally. White Gold would be Gold but with dark valence electron. The electron configuration of Gold is $[Xe]4f^{14}5d^{10}6s^1$. There is single unpaired electron with principal quantum number $m = 6$ and this would be dark for White Gold and chemically like Platinum (Pt), which indeed has white color.

2.2 Biologically important ions as analogs of ORMEs?

In TGD inspired biology the biologically important atoms H^+, Li^+, Na^+, K^+, Ca^{++}, Mg^{++} are assumed to be dark in the proposed sense. But I have not specified darkness in precise sense. Could these ions have dark valence electrons with scaled up Compton length and forming macroscopic quantum phases. For instance, Cooper pairs could become possible and make possible high Tc superconductivity with members of Cooper pair at parallel flux tubes. The earlier proposal that dark hydrogen atoms make possible biocatalysis becomes more detailed: at higher evolutionary levels also the heavier dark atoms behaving like noble gases would become important in biocatalysis. Interestingly, Rydberg atoms have been proposed to be important for biology and they could be actually dark atoms [K4].

To sum up, if TGD view is correct, an entire spectroscopy of dark atoms and partially dark molecules is waiting to be discovered and irradiation by light with energies corresponding to excitation energies of dark states could be the manner to generate dark atomic matter. Huge progress in quantum biology could also take place. But are colleagues mature enough to check whether the TGD view is correct?

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