Ungerade Parity, Balanced Positive and Negative Nuclear Magnetic Moments for Above Room Temperature Superconductivity

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Abstract

The mystery of superconductivity has intrigued scientists for 110 years now. The author in 2014 specifically predicted the superconductivity in carbon, sulfur and hydrogen compounds [1] and generally predicted carbonaceous, hydrogeneous and sulfurous compounds in 2005 [2] with reference to scattering to asymmetric orbital motions and associated spin and orbital exchanges between nuclei and electrons. The emphasis was in 2005 upon stronger electron and nuclear interactions and electron phonon effects. But here the author develops more the ungerade parity of the p and f orbitals and their contributions to the superconductivity at lower pressures and higher temperatures. On the basis of such, the role of parity from the Origin and Inflation of the Universe is noted and Dark and Bright Energy and Matter in the mature Universe is reasoned. Moreover the superconductors are all reasoned by positive and negative NMMs with availability of ungerade parities of p and f subshells and their orbitals.

Above room temperature superconductivity was predicted in 2014 by the author in compound containing carbon, sulfur and hydrogen at high pressures [1]. The role of the p orbital and its stronger electron nuclear interaction relative to the d orbital and wider gap of frontier orbitals of 2p and 3p orbitals were proposed for inducing superconductivity at higher critical temperatures (T_c). The role of nuclear motions as vibrations of nuclei transform to rotations of nuclei was also suggested by the author for inducing and mediating superconductivity at higher temperatures [3] via proton orbitals and nuclear orbitals in general. In this work the author develops more the transformation of nuclear motions from vibrations to rotations as facilitated by nuclear spin and nuclear magnetic moments (NMMs) for not only facilitating superconductivity but also better explaining some chemical reactions in general in particular chemical reactions of nanostructures and biomolecular molecules for better understanding biology. Furthermore, the author introduces nuclear rotations as facilitated by nuclear spin and NMMs for facilitating and explaining various physical properties that are currently not well theorized such as the theory of the liquid state, the explanation of melting points of various substances, the properties of various liquids, and the vaporization of liquids. Such physical properties are here proposed to be better explained by differing nuclear motions in the different physical states as the gaseous state has nuclei translating and the plasma state has nuclei possibly rotating and revolving while translating. The author introduces that the liquid state is various mysterious as the transition from gaseous to liquid state involve nuclei transforming motions from translating to rotating nuclei. The author further notes the solid state involves the nuclei vibrating so solidification can better be understood by including nuclear motions of rotating nuclei in liquid to vibrating nuclei in solid during freezing. The author notes various substances differ in gas to liquid transformations depending on their isotopic compositions of spins and NMMs for inducing translating nuclei to rotating nuclei in liquid state from gaseous state. Also such NMMs facilitate the transformations of rotating nuclei to vibrating nuclei during freezing by the authors model.

The author further notes the importance of external electromagnetic radiations of types radio waves, microwaves and infrared waves and static magnetic fields and electric fields for accelerating or decelerating such physical changes in addition to novel catalytic and chemical changes by affecting nuclear vibrations to rotations and vice versa. In 2003, the author discovered the lowering of melting point by strong static magnetic field upon silicon in hydrogen atmosphere and such may be explained by the induced rotation of ^{29}Si nuclei in the silicon at lower temperatures in the magnetic field as the nuclei vibrations transform to nuclear rotations [4]. The author further notes important affects of this presented nuclear vibrations to nuclear rotations on various novel chemical and biochemical reaction dynamics, catalyses and enzymatics and novel ways of controlling such dynamics by long wavelength electromagnetic waves and magnetic and electric fields. On such basis the author has introduced novel effects of radiations on proteins, nucleic acids and other biochemical molecules for understanding life processes.

But here novel nuclear rotations and revolutions relativistically and dynamics of nuclei rotating and the interior rotations and revolutions relativistically of nuclei parts of nucleons are noted for explaining superconductivity and raising the temperature at which superconductivity occurs and finding substances that superconduct at both high temperature and low pressures (toward atmospheric pressures). The clockwise (CW) and counterclockwise (CCW) rotations for symmetric and asymmetric rotations and revolutions are noted. Symmetric revolutions refer to the revolutions of electrons in most hydrogen nuclei and are arbitrarily given CW symmetry. Asymmetric orbits are given CCW symmetry. The theory here further develops the nuclear rotations and revolutions coupling to electronic orbitals and revolutions (revorbitals) for explaining superconductivity and other phenomena of physical properties, chemical properties, catalyses and enzymatics. But here the effects are related to the origin of the Universe and Inflation and a novel theory of bright and dark matter and interactions causing these novel phenomena of nuclear and electrons rotations and revolutions for novel properties of superconductivity, chemical transformations and nuclear reactions.

The author here further develops his prior notion that that bright (Br) and dark (Dk) matter and energy originated from the Origin of the Universe as before the Origin there was nothing (zero) and zero being infinity of zero (+1 – 1) and The Creator (-1) involved a Bang and the Bang manifested -1(s) and the Original Singularity. The Original Singularity accelerated (for time and – sensible change) in zero (1-1) and separates zero into 1(s) and -1(s) by Inflation of the Original Singularity as noted by the author's theory. The Inflation continues at the edge of the Universe as zero (1-1) at edge is perpetually separated into -1(s) and +1(s) but due to the original -1 Singularity there is more -1. The acceleration stretches and rarefies the -1(s) in 'sensible dynamics' across the bread of the universe and the acceleration is countered by the production (for 'latent dynamics') of dense regions of -1(s) and +1(s) and the -1(s) are more abundant with tiny solute amounts of +1(s) in the mature Universe and manifest Dark Matter in its accumulations and in some regions +1 solvent and tinier amounts of -1 solutes (our sector of the Universe). The author proposes the stretched fractional irrationals superluminous -1 as dark energy and the clumps of -1 with tiny amounts of +1 as dark matter. Br matter in our sector of the universe is more clumps of +1 with tinier amounts of -1 as fused to leptons and hadrons. The author notes intrinsic time symmetry difference of Dk energy relative to Br energy as during Inflation the motion of Dk outward is simultaneous with Br and Dk clumps in latency. So as Br and Dk clumps experience sensible dynamics the background (rarefied superluminous Dk) is perpetually stretching outward but not rarefying to zero as the production of -1 at edge. But the denser clumps of +1 Br in our sector of Universe are confined and oscillate linearly, curvilinearly or spherically or composites of linear, curvaceous and spherically. But interacting with the rarefied Dk Background the Br moves against the Dk background to cause relative latent Dk background while Br is sensibly stretching or compressing. And in Dk sector the Dk clumps move to stretch more in concert with Dk background and to compress to cancel the Dk background. So in particles having similar clumped Dk and clumped Br the background is cancelled as Br stretches and the Dk background cancels as the Dk clumped compresses. Thereby the rarefied Dk background causes temporal shift in the sensible and latent dynamics of clumped BR and clumped Dk as clumped Br is sensible in compressing or stretching the clumped Dk at that moment is latent and as the clumped Dk transforms from latent to sensibly dynamics of stretching or compressing then the clumped Br goes to latent. So the imbalance of the perpetual rarefied superluminous Dk expansion in background creates imbalance between clumped Dk and clumped Br and time discontinuity to explain the clump Dk not interacting with clumped Br in some scales. The clumped Dk and clumped Br exists in particles in our sector as nuclei with negative NMMs and nuclei with positive NMMs. Dark matter in other regions of the Universe has particles of negative NMMs.

But in our region of the Universe these particles having tiny excess of Dk are in nuclei having negative NMMs. Most of the matter in our sector of Universe has positive NMMs or null NMMs. The protons, neutrons and electrons in our region of Universe have bright matter characteristic with some tinier essence of Dk energy and Dk matter. The excess Br as by positive and null NMMs in most matter in our sector of Universe causes dissipative motions as the kinetic energy of moving Br particles readily transforms to thermal energy in the Dk background as the motion cannot be rhythmically confined for long enough time against transforming in the rarefied Dk background. In such imbalance local space, the balance of Br and Dk motions of transport in the imbalanced background cannot be sustained so the balanced motion dissipates to thermal space in the Dk background rarefied space. But in some systems with balance of clumped positive and negative NMMs, the Br and Dk motions locally may be balanced and in oppositions so the thermal space cannot escape the opposing motions of Br and Dk and the thermal energy is transduced to electric, gravitational, magnetic and/or quantum energies; so the motion occurs without dissipation by the thermal as the thermal is transduced to organizing fields that sustain the superconductivity and superfluidity.

In addition to NMMs the orbital motions of electrons can manifest different symmetries of Br and Dk in directionality as manifested by orbital parity. The nuclei cannot only flip electron spin as the electron cross the nuclei and interact with nuclei. But the electrons can change orbital directions as by interacting with nuclei. And orbitals of difference angular momenta have different symmetries of the nuclei altering parity as orbitals of even azimuthal quantum numbers manifest gerade symmetries as by interacting with nuclei and orbitals of odd azimuthal numbers manifest ungerade symmetries as by interacting with nuclei. In the model presented here, the author notes the elements having valence subshells occupied of ungerade symmetry host superconductivity more readily as they impart more balance of odd and even parities and negative and positive momenta and Dk and Br fields as by interacting with nuclei with consequent transformations of thermal energies to magnetic energies and quanta. The occupancy in subshells of odd azimuthal quantum numbers (like p subshells and f subshells) contribute superconductivity at higher temperatures than electrons in orbitals of even azimuthal quantum numbers (like s and d subshells). The superconductivity occurs at even higher temperatures for the ungerard subshells with nuclei having positive and negative NMMs. The superconductivity may be involving frontier orbitals where the ground state is gerade and there are low lying or accessible conduction states or impurities having ungerade parity and/or positive and/or negative NMMs of the impurities.

On the basis of such further development of NMMs and lepton magnetic moments, the subshell parity is further demonstrated here to explain patterns in superconductivities among elements and compounds of different elements with correlating the critical temperature and pressures required for the superconductivity. For instance type I superconductivity was discovered in Hg at very low T_c in 1911 by Onnes [5] and such superconductivity is explained by this theory as Hg has electronic configuration with filled 6s and 5d orbital and empty 6p orbitals so the superconductivity involves these frontier orbitals whereby the 6s or 5d electrons of gerade parity are excited in continuum betwixt 6p subshell of ungerade parity so the 6p imparts mix of + and – orbital angular momentum of electrons in the orbitals for facilitating the transduction of thermal energy at higher temperatures to orbital magnetism and the binding of scatter superconducting electrons at higher temperatures. The Hg also has isotopes of both positive and negative NMMs for facilitating such superconductivity. It is important that these aspects of the frontier orbitals of Hg of 6s and 5d valence and 6p conduction of gerade and ungerade parities with isotopes of both positive and negative NMMs also explain the unusual low melting temperature of Hg and it being the only liquid metal.

From Hg , then higher T_c were observed in Pb and Nb. On the basis of the orbital parity as developed more here and prior positive and negative NMMs already published, the increase in T_c from Hg to Pb follows from the valence of Pb involving unfilled 6p orbitals of ungerade parity for the higher T_c of Pb. The Nb however may involve more of the unusually large +6.17 NMM with 100% of ^{93}Nb elements for affecting the gerade orbitals of 4d for explaining the superconductivity in ^{93}Nb. But the T_c of Nd is raised much higher by including Nb in compounds with some p block elements and the involvement of ungerade p orbitals as in NbN, NbSn and NbGe superconductors (in order of increasing T_c). It is important to note that all of the p block elements (^{15}N, ^{115}Sn, ^{117}Sn, ^{119}Sn, and ^{73}Ge) in these Nb superconducting compounds have isotopes of negative NMMs with further consistency to this theory of the author!

And then some carbon compounds as M-C_{60} (with M= K, Rb, Cs, at high pressures) and YbPdBC manifest even higher T_c than the Nb compounds and this can be reasoned by the model theory here by the p orbitals and lower principle quantum numbers of B and C relative Sn and Ge in NbSn and NbGe. But B and C have positive NMMs but the ungerade nature of the p orbitals and the positive and negative NMMs in Yb and Pd are explaining the superconductivity by this model in spite of only positive NMMs in the C and B. On the basis of this, the author has proposed in the past that higher and even room temperature superconductivity may be observed even at low pressures toward atmospheric pressure in thin films and single to few layer $^{10}B^{15}N$ and $^{11}B^{15}N$ and $^{13}C^{17}O$ graphene oxide on the basis of the authors theory as the ^{15}N and ^{17}O enriched in these structures to 100% would give 100% negative NMMs of ^{15}N and ^{17}O for supporting the superconductivity by the negative NMMs of the ^{15}N and ^{17}O in these compounds and the ungerade natures the 2p orbitals of the ^{15}N and ^{17}O .

And so the superconductors involving $CeCuSi_2$ can be reasoned on basis of the ^{29}Si and its negative NMM and the 3p orbital for Si and its ungerade parity and further more the Ce and its 4f orbital and contributions of ungerade parity by 4f orbital in the unit cell. And UBe_{13}, UPt and $UPdAl_3$ may be reasoned for their superconductivities by this model on basis of negative 1.17 NMM of ^9Be with 100% and the 5f orbitals of U contributing ungerade parity. And both U contributing ungerade parity to Pt and possible accessibility to 6p orbitals in Pt anions. The $UPdAl_3$ further manifest ungerade orbital contributions of U to the superconductivity with negative NMMS of Pd and positive NMMs of the Al on the basis of this theory.

The cuprates may be reasoned for their superconductivity on basis of negative NMMs of few ^{17}O and the p orbitals seating the O with ungerade parity for sustaining superconductivity with cations providing positive and negative NMMS. The arsenates of iron give strong evidence of this role of orbital magnetism and ungerade nature of the orbital parity for the superconductivity as ^{75}As has all positive 1.43 NMMs with 100% and the ^{75}As lacks the negative NMMs as in cuprates as by ^{17}O for manifesting the superconductivity. But the positive NMMs in arsenates have central metals of iron and the magnetism of the iron central atoms accelerate the superconducting 4p electrons about the As with their ungerade parity to manifest the negative lepton moment in orbital motion for seating the superconductivity. The difference in magnetism of Cu and Fe in cuprates and arsenates leads to cuprates requiring negative NMMs of ^{17}O and orbital p ungerade for superconductivity whereas iron arsenates do not need negative NMMs but positive NMMs of ^{75}As host superconductivity as the Fe magnetically accelerate the ungerade p orbitals for negative moments in the positive NMMs of the ^{75}As. Thereby here it is reasoned the ferromagnetism may accelerate ungerade orbital electrons to cause fields like emanating from nuclei having negative NMMs.

So now since 2005, the author [2] proposed higher temperature superconductivity in hydrogen and sulfur containing compounds and in hydrogen and carbon compounds and also in iron hydrogen compounds. Later in 2014 and 2015, the dramatic increase in T_c was computed and observed by Ma [6] and Eremet [7], respectively. But these great advancements toward room temperature superconductors of hydrogeneous sulfides also follow from the theory here as H and its p^+ act directly on the electrons so the proton NMMs in direct action on valence electrons of S manifest a negative type NMM as in H the proton is its own nucleus unlike in other elements and likewise in He.

So the power of the author's theory is manifested even more by developments after hydrogeneous sulfides as the LaH_{10} was found to superconduct at even higher T_c. The theory described here as reasoned by the author explains the higher T_c of LaH_{10} on basis of the contribution of the ungerade orbital symmetry of 4f of La relative to the lower speed orbital ungerade symmetry of the 3p of S in hydrogeneous sulfides. But the theory is further revealed in its power as it explains the lower T_c of YH_{10} relative to LaH_{10} in spite of higher expected T_c predicted in YH_{10} by current electron phonon models. But the theory of the author as presented here reasons and explains the recent elevation of T_c in the YH_{10} by incorporating Pd as the Pd is more electronegative than Y and H and may fill its d subshell with availability of 5p subshell and the ungerade parity of the 5p for coupling with YH_{10} to raise the T_c as observed recently in such materials.

So in 2020 the superconductivity in carbonaceous hydrogen sulfides was observed. The theory presented here explains this superconductor as well as the carbon and sulfur are members of 2p and 3p subshells with the ungerade parity of the p subshell orbitals for contributing negative moments by orbital Dk and – spaces for explaining the superconductivity from such orbital ungerade parity balancing the positive NMMs of ^{1}H, ^{33}S and ^{13}C and gerade orbital symmetry for the balance hosting the superconductivity at high pressures. But the theory presented here also explains the recent superconductivity in bi-layer and tri-layer graphene with slight twist between layers as the pi orbitals and aromatic ring currents above and below the C nuclei host the superconductivity via pure p_z orbitals and their ungerade parity. So some layers may have - parity of one graphene layer and + parity of an the nearby graphene layer for – parity aromatic rings of adjacent graphene sheets interacting to provide necessary balance of – and positive magnetic moments for momentary rarefactions for Br and Dk gravities for manifesting the superconductivity as the opposing balanced motions of negative and positive NMMs and rarefactions to Br and Dk gravities for preventing thermal space to escape for transformations of the thermal energies to electric, gravitational and magnetic energies and even quantum energies for sustaining superconductivity.

From a purely theoretical perspective, the author is very intrigued by reports of superconductivity in silver nanostructures in gold nanofilms of Pandey and Thapa [9]. This controversial experimental study has not been replicated. But the author has for more than two years reasoned the theoretical possibility of such by the theory here as the gold has 100% positive NMMs and the silver has 100% negative NMMs for balance of the NMMs and as further developed here the electronic configurations of both Ag and Au have filled 5s and 4d and 6s and 5d subshells for available empty 5p and 6p orbitals , respectively, of ungerade parity for hosting the higher temperature superconductivity. But the experimental verification has been missing.

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