Quantum theories in science and technology

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ABSTRACT

In this paper, we forth universal quantum theories in science and technology, relevant to mechanics and dynamical systems of multi-body grand canonical bodies. The quantum theories are generalizable to millions to billions of interactive bodies of different properties, interactions and science and technological applications from quantum computing, Q-LEDs, Q-heat transfer, Q-hydrodynamics, Q-EHMD, spintronics, Q-engineering and measurement with the theory laid here for quantum science and technology.

Keywords— *Quantum Mechanics, Quantum Dynamics, Quantum Theory, Applications, Technology*

1. INTRODUCTION

Quantum mechanics and Quantum dynamics has evolved over the last 60 years in the field of science and technological development with the first step of Quantum mechanics and Quantum dynamics problems, arriving in the field of LEDs design and manufacture of new cameras [1]. Quantum science for technological leap jump, laid to setting theories and formulation in the giant technological applications, apart from cameras, was in computers and big industry manufacturing applications [1-3]. Camera, motion capture industries, computing industries, big industry manufacturing industries, often time work with many millions to billions of interactive bodies yet need a high precision product working to generate output for best quality result for maximum utilization of the product they work with or they manufacture for end user applications [1-3]. Quantum science with all interactive bodies, millions to billions, completes the missing puzzle in science for best quality product to use and that is to be made and has been made [3,4].

Quantum theory with canonical Hamiltonian having intelligent matrix inversion, with no loss of missing every interaction from that million or billion to produce precise result matching its corresponding experiments is the holy grail. In this paper, we give the quantum theories for millions to billions interactive Hamiltonian body mechanics and dynamics to produce the precise result matching its corresponding experiments.

2. QUANTUM THEORY

2.1 Canonical Hamiltonian Million-To-Billion Body Interactions

Fig. 1. and Fig. 2. shows schematics of many different body interactions and similar body interactions yielding a canonical system in total. The quantum theory to solve the millions-to-billions many-body-interactions and same-body-interactions, to make the computations, calculations, and yield final result congruent to the objective of producing precise result for the problem on interest, theoretical, measurement, or manufacturing for many applications of interest.

2.2 Hamiltonian Equation

$$H\varphi = E\varphi \tag{1}$$

Eq. (1) gives, the generalized Hamiltonian to many millions-to-billions similar and dissimilar bodies interaction dynamics involving different forces during their individual interaction body mechanics or dynamics that determines the working function, of the end measurement device or computing use or manufacturing applications for any use.

Here, the objective is solving for Hamiltonian H or Energy E, in Eq. (1) for the many millions-to-billions body interactions of similar and dissimilar bodies interaction for a given canonical system. It is obvious, that inversion or numerical calculation of finding the Hamiltonian H, matrix for millions-to-billions of energies is computationally, expensive and near to impossible. Also, iterative minimization of the Hamiltonian or energy minimization techniques or solving system of millions-to-billions systems of linear equations to find the final solution for each energy, of the Hamiltonian, for each body is impossible computation.
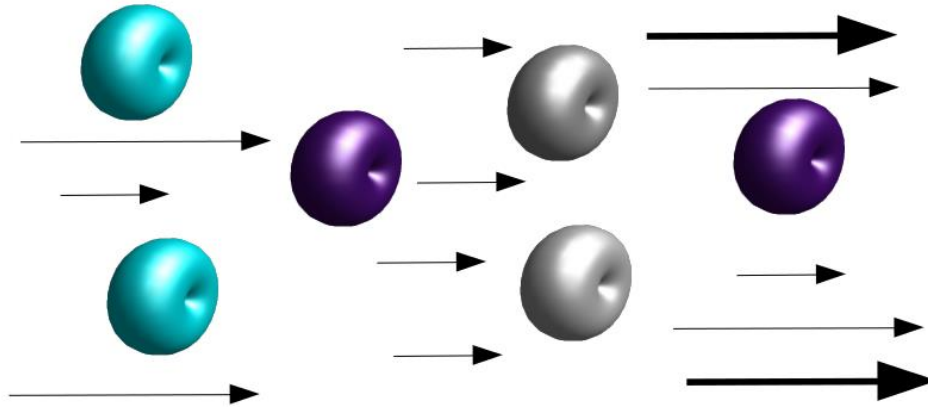
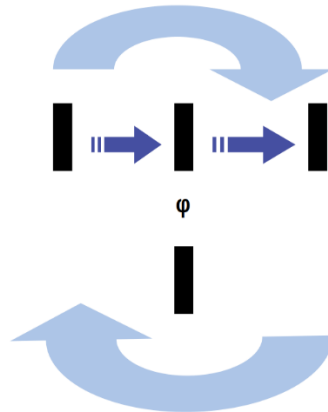**Figure 1. Schematic set up of multi-body quantum dynamical system**

Figure 2. Hamiltonian ensemble interaction with many quantum dynamical systems

In order to solve, the Hamiltonian Eq. (1) for many millions-to-billions body interactions of similar and dissimilar, below formulation of Hamiltonian will scale up the computations for the same quantum mechanical or dynamical system with no loss of information or no loss of accuracy in the problem considered for study, of a quantum dynamical system.

3. SOLUTION TO HAMILTONIAN MILLION-TO-BILLION BODY INTERACTIONS
3.1 Algorithm
In a given canonical Hamiltonian problem of interest, the Hamiltonian matrix is derived based on the interactions for all particles/bodies of interest with the primary body, they interact. This interaction results in arriving at usual Hamiltonian matrix H, where the field φ, for the property of interest say, position for a measurement experiment, velocity for a EHMD experiment, light intensity, luminescence or heat transfer coefficient of corresponding applications and devices in manufacturing industries and products used in new age products available to us nowadays. Oftentimes, this is not easy, because the interactions to arrive at Hamiltonian, H are calculated based on first-principle studies while the quantity of interest for finding the solution, is a field property, considering all M by M matrix elements interactions at the same time for each field property, φ_1.

The challenge, for matrix inversion, is addressed, only, by accounting for all interactions of millions-to-billions of bodies on the body of interest as an additive vector, Hamiltonian, H, than a matrix, Hamiltonian H. The resulting Hamiltonian equation of same Eq. (1) with no approximations, will be a vector, $H\varphi = E\varphi$, that is invertible for the Hamiltonian to compute for millions-to-billions of canonical body interaction dynamics, to calculate the work function, φ, vector. The mathematics of final vector Hamiltonian inverse, H^{-1} and multiplying with the wave function, φ vector, yields the final result.

Inverse of vector Hamiltonian,
$$H = H^{-1} = H/|H|^2 \tag{2}$$
Inverse of vector, Energy Function,
$$E = E^{-1} = E/|E|^2 \tag{3}$$

Resulting generalized canonical Hamiltonian system is given by,
$$H\varphi = B \tag{4}$$
where B is the RHS vector, obtained from the boundary conditions in the state space with the millions-to-billions bodies it is interacting for that boundary condition.

Finally, the vector φ is obtained as given below,
$$\varphi = H^{-1}B, \tag{5}$$
The vector, φ is obtained and many manifold fast computations for such a billion-body interaction system is possible with no loss of accuracy and information.

4. CONCLUSIONS

Here, a universal quantum theory in science and technology, relevant to mechanics and dynamical systems of multi-body grand canonical system interacting with millions-to-billions of interactive bodies of different properties, interactions and media is presented. The large number of interactions from quantum theories computations, produces precise calculations and solutions to scientific questions and technological applications from quantum computing, Q-LEDs, Q-heat transfer, Q-hydrodynamics, Q-EHMD, spintronics, Q-engineering, measurement and new quantum technologies for today's use.

5. ACKNOWLEDGMENTS

6. REFERENCES

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