Quantum Stochastic Mechanics(QSM)the Hidden. 2017/4/28,5/4

Especially as for former Time Dependent Quantum Mechanics,it had been being not correct ! ,The True Explanation is to Cause Revolution in Quantum Mechanics.It is lead to **Stochastic Theory** the mathematically well established one.

Prologue：Author happened to be **income-less physics researcher** in 1985,In 1986,also he noticed **time Independence of energy observable Hamiltonian**.This was the starting point. At last,in1990,he lectured whole theory of **QSM** in Physical Society Annual Meeting at Gifu University.This report is to reveal the theory with many new insights.Then note that **International Physical Society** has been still neglecting this serious essential results. They had been rejecting publication of all authors contributing thesis.Now you could see who is right and who is liar !!. At now 2017,also **the deadly climate fact** causing possibility of global mass extinction in near future(～2140,unless countermeasure)has been substantially hiding by the international scientist society(IPCC).Thus also you must be awaken to notice necessity of **re-verifying established sciences** from the very bottom by you yourself.

http://www.aljazeera.com/news/2017/04/march-science-protesters-call-science-respect-170422195357740.html

☞:Readers are assumed to have once learned Quantum Mechanics. The keywords are,

Schrödinger equation,
Hamiltonian=H,
qunatum state= Ψ,
*quantum observation,**observable** as dynamical variable(hermitian operator),*
***eigen state** with eigen value,* ***superpositional state**,*
commutable operators,
*conservative variable(good **q**uantum **n**umber=**qn**), non conservative variable(bad **qn**),*
instantaneous state transition, wave packet convergence,

https://en.wikipedia.org/wiki/Introduction_to_quantum_mechanics

Math review for Quantum Mechanics: http://www-dft.ts.infn.it/~resta/fismat/ballentine.pdf

http://www.fisica.net/quantica/Griffiths%20-%20Introduction%20to%20quantum%20mechanics.pdf

The Summary:

❶**Time and Energy Uncertainty Principle** by modified Winer-Kinchin Theorem.

$\Delta t(t)\,\Delta E(t)=\hbar$.

❷Hermitian(self adjoint)operator as **Observable Physical Variable** in Quantum Mechanics

Time independency of Hermitian Hamiltonian $\equiv \mathbf{H_0}.\rightarrow\{\Delta t=\infty$、$\Delta E=0\}$.

Time independency of maximum observable of $\mathbf{H_0}.\rightarrow\{\Delta Q_r(t)=\infty$、$\Delta P_r=0\}$.

$i\hbar dP_r/dt=[P_r, \mathbf{H_0}]=0$. $\langle r=1,2,\ldots,M\rangle$. . . this is also called good quantum number.

Unique Eigen State Realization of $(\mathbf{H_0}.\{P_r\})$ in Sample Process. → **Markovian**.

But not those superposition state<*Paradox of Schröodinger's Cat*>.

❸Time Depedent Hamiltonian $\equiv H_S(t)$ must be non herimte singular $\rightarrow\{\Delta E=\infty$、$\Delta t=0\}$.

(1)vertical quantum state transtion by random alternating Hamltonian $\{\mathbf{H_0}, H_S(t)\}\rightarrow$ **Markovian**.

(2)time rate of random generation $H_S(t)=1/\Delta t(t)=\Delta E(t)/\hbar$.

(3)**1st order quantum transition amplitude** : $R_{fi}=\langle f|\int_0^{\Delta t}dt H_S|/i\hbar|i\rangle$

transition probability : $\rightarrow T_{fi}=R_{fi}{*}R_{fi}$. $\langle 1={}_f\Sigma_f T_{fi}$. . . **normalization**$\rangle$.

☞: As is above,this theory does not need multi order quantum amplitude derived by so called **perturbation method** sometimes with so called **divergence difficulty**.

This theory is completely free from indefiniteness on quantum state transition calculation In the principle.However the actual calculation on multi-body system is not easy.

(4)**transition probability rate** from **state** $|i\rangle$ to $|f\rangle$.

$\Gamma_{fi}(t)=[\Delta E(t)/\hbar]\,T_{fi}$.

❹**Establishing Master Equation for Quantum Stochastic Process.**

Or **Schrödinger Equation with stochastic Hamiltonian** $\{\mathbf{H_0}, H_S(t)$ by $\Delta E(t)/\hbar\}$.

$d\omega_j(t)/dt=\Sigma_k\Gamma_{jk}(t)\,\omega_k(t)-\Sigma_k\Gamma_{kj}(t)\,\omega_j(t)$.

density change rate =*(inflow sum—outflow sum)/unit time*..........This is account principle

❺Solutions for closed system and non closed one.

$\omega(t)=\Sigma_{n=0}^{\infty}\mu_n(t)\,T^n\omega(t_0)$. . . . . **Markov Chain Expansion**.

After all,equation ❹ was found to be **relaxation process solution in general closed system(2nd law of Thermodynamics)**.See also as for non closed one.

http://www.777true.net/img007-Quick-Guide-to-Quantum-Stochastic-Mechanics.pdf

[0]: Experimental Background(Wave-Particle Duality of Quantum Phenomena>.

http://www.777true.net/CANONICAL-QUANTIZATION-PRINCIPLE.pdf

At least,you should read and understand p1,2,3.Historically,Quantum Mechanics was initiated by following important historical experiments with hypothesis.

Ⅰ:Radiation Wave Field reveals Particle-like Feature.

Plank's blackbody radiation(1900). $E=h\nu=\hbar\omega$. → $\omega=E/\hbar$. <h=Plank's constant>

Ⅱ: Particle(electron) reveals Wave Field-like Feature.

De Broglie's matter wave(1924). $\lambda=h/p$. → $k=2\pi/\lambda=p/\hbar$.

Ⅲ:synthesizing plane **quantum wave function** : $x_\mu=(ict,\mathbf{x})$, $p_\mu=(iE/c,\mathbf{p})$.

$\Psi(x,t)=\exp i(-\omega t+kx)=\exp\langle(Et-px)/i\hbar\rangle=\exp[(-x_\mu p_\mu)/i\hbar]$.

$E\Psi=i\hbar(\partial/\partial t)\Psi$, $p\Psi=(-i\hbar\partial/\partial x)\Psi$; $p^2/2m\Psi=[(-i\hbar\partial/\partial x)^2/2m]\Psi$。

$E=p^2/2m$ → $i\hbar(\partial/\partial t)\Psi=[(-i\hbar\partial/\partial x)^2/2m]\Psi$. . . . . **(quantum) wave equation**.

Ⅳ:The First Success in Hydrogen Atom(1926) by Ervin.Schrödinger.

$E=p^2/2m+V(r)$ → $i\hbar(\partial/\partial t)\Psi=[(-i\hbar\partial/\partial x)^2/2m+V(r)]\Psi$. . . . Hydrogen Atom.

Ⅴ:The Conclusion<physical variable as ***operator*** and the operand of ***wave function*>**

$E(=\mathbf{H})$ ⇔ $i\hbar(\partial/\partial t)$; p_x ⇔ $(-i\hbar\partial/\partial x)$;

$\mathbf{H}=p^2/2m+V(r)$ → $i\hbar(\partial/\partial t)\Psi=\mathbf{H}\Psi$. . . . **Schrödinger Equation**.

[1]: A important episode on Time in quantum mechanics.

Time Evolution Process in classical mechanics can exactly predict future trajectory of mass particles by $M(d^2X(t)/dt^2)=F(t)$........**Newton Dynamic Equation**.

Former time evolution quantum process theory by Schrödinger Equation is not exact.

$i\hbar\partial\phi(t;\mathbf{x})/\partial t=\mathbf{H}(t;\mathbf{x})\phi(t)$.

In fact,time dependent $\mathbf{H}(t;\mathbf{x})$ can not be causative time dependent operator,but stochastic one.Hamiltonian is energy observable,while the time dependence is to encounter difficulty. Because uncertainty principle on **time & energy** never allow simultaneous decision on exact both variables.Hence the theory could not help to be rather crooked one.Problems of stationary state and scattering process never describe explicit time dependence.Below may be a time problem example.The essence is in **Statistical Ensemble Averaging**.

Eherenfest's theorem reviving ***classical mechanics*** in averaged quantum mechanics.

$i\hbar\partial\phi(t;\mathbf{x})/\partial t=[(-\hbar^2/2m)\nabla^2+V(\mathbf{x})]\phi(t;\mathbf{x})$. → proof is abbreviated here

→ $\langle\phi|md^2\mathbf{x}/dt^2|\rangle=\langle\phi|-\mathrm{grad}V(\mathbf{x})|\phi\rangle$.

Due to above conclusion,time in quantum mechanics seems entirely the same in that of classical one.Thus many had been trapped and going on with this deadly misinterpretation.

[２]：Time & Energfy Uncertainty Relation by the Statistical Mathematics：
“Evolution Principle by Energy Fluctuation”.

*Time domain **Corelation Function** is measure for function shape decaying intensity of $\Psi(t)$ and $\Psi(t+\Delta t)$,while the frequency domain representation give us deep insight on **time and energy uncertainty principle** in **state decaying**.This is not dynamics,but mere a math principle.*

①semi macroscopic finite integral time duration: $T(t)\equiv[t-□T/2, t+□T/2]$. $0<□T<\infty$.

②Fourier component of $\Psi(t)$: $c(\varepsilon;t)\equiv(2\pi\hbar)^{-1/2}\int_{T(t)}du|\Psi(t)\rangle\exp(\varepsilon u/i\hbar)$

③**State density**: $\omega(\varepsilon;t)\equiv\langle c(\varepsilon;t)|c(\varepsilon;t)\rangle/□T$

$=(□T.2\pi\hbar)^{-1}\int_{T(t)}du\int_{T(t)}dv\langle\Psi(u)\rangle|\Psi(v)\rangle\exp(-\varepsilon(u-v)/i\hbar)$.

④**Inverse Transform**: $\int_{-\infty}^{\infty}d\varepsilon\exp(-\varepsilon\Delta u/i\hbar)\omega(\varepsilon;t)$

$=(□T2\pi\hbar)^{-1}\int_{T(t)}du\int_{T(t)}dv\langle\Psi(u)\rangle|\Psi(v)\rangle\int_{-\infty}^{\infty}d\varepsilon\exp(-\varepsilon(\Delta u+u-v)/i\hbar)$

$=(□T)^{-1}\int_{T(t)}du\int_{T(t)}dv\langle\Psi(u)\rangle|\Psi(v)\rangle\delta(\Delta u+u-v)=(□T)^{-1}\int_{T(t)}du\langle\Psi(u)|\Psi(\Delta u+u)\rangle$

⑤***modified Winer Kinchin Therem for non Equibrium Statistical Mechanics.***

$(□T)^{-1}\int_{T(t)}du\langle\Psi(u)\rangle|\Psi(\Delta u+u)\rangle\equiv\Upsilon(\Delta u;t)=\int_{-\infty}^{\infty}d\varepsilon\exp(-\varepsilon\Delta u/i\hbar)\omega(\varepsilon;t)$

$=\int_{-\infty}^{\infty}d\varepsilon\,\omega(\varepsilon;t)[1-i\varepsilon\Delta u/\hbar-\varepsilon^2\Delta u^2/\hbar^2/2+..]=1+i\langle\varepsilon\rangle\Delta u/\hbar-\langle\varepsilon^2\rangle(\Delta u/\hbar)^2/2+....$

⑥$|\Upsilon(\Delta u;t)|=[(1-\langle\varepsilon^2\rangle(\Delta u/\hbar)^2/2))^2+\langle\varepsilon\rangle^2\Delta u^2/\hbar^2]^{1/2}+......$

$=[1-\langle\varepsilon^2\rangle(\Delta u/\hbar)^2+\langle\varepsilon\rangle^2\Delta u^2/\hbar^2+\langle\varepsilon^2\rangle^2(\Delta u/\hbar)^4/4)]^{1/2}+......$

$=[1-(\Delta u/\hbar)^2[\langle\varepsilon^2\rangle-\langle\varepsilon\rangle^2]^{1/2}+......=[1-(\Delta u\Delta\varepsilon/\hbar)^2]^{1/2}+......$

⑦**1≧$|\Upsilon(\Delta t;t)|$≧0 and the meaning of Energy and Time Uncertainty Principle**.

$|\Upsilon|$ ***the corelation function*** is **measure** for **state decaying rate** by time$=\Delta t$ for initial state=$\Psi(t)$ to final state=$\Psi(\Delta t+t)$. If $\Delta t\Delta\varepsilon=\hbar$, then $|\Upsilon(\Delta t;t)|=0$, which means **transition completion** from initial state=$\Psi(t)$ to final state=$\Psi(t+\Delta t)$.

Energy and Time Uncertainty Principle<[２]:⑦>.

“Evolution Principle by Energy Fluctuation*”.*

$\Delta t(t)\Delta E(t)=\hbar$.

$\Delta E(t)=$**energy deviation** in statistical ensemble.

$\Delta t(t)=$**transition time** in statistical ensemble by ΔE.

☞:As had been told,uncertainty principle may be not principle,but theorem on relation between time-space domain and frequency-momentum domain in **Fourier Transform**. Then note energy is frequency in quantum mechanics.Also note time invariance of action functional yield energy conservation law,that of space variable is momentum one.Those should be called Canonical Variable(Commutation) Principle.

[3] : Observable Hamiltonian ≡ H_0 never depend on time(stationary).

(1)**Hermitian operator representation by orthogonal complete function set**.

orthogonal complete function set.

$\langle e_j | e_k \rangle = \delta_{jk}$. $\langle e_r | e_s \rangle = \delta(r-s)$...... contineous spectrum case.

Definition on **Hermitian(=self adjoint) operator.**

$\mathbf{A} | e_j \rangle = \Sigma_k a_{jk} | e_k \rangle$. $\rightarrow \langle e_m | \mathbf{A} e_j \rangle = a_{jm} \equiv \langle \mathbf{A} e_m | e_j \rangle = a^*_{mj}$

Diagonalization by unitary transform of basis.

$\langle e_j | \mathbf{A} | e_j \rangle = a_{jj} = a^*_{jj} \equiv a_j$............ **Eigen Value** as real number.

$\mathbf{A} | e_j \rangle = a_j | e_j \rangle$. (j=0, 1, 2, 3....)..... **Eigen Equation**

(2)**Schrödinger Equation Solution with Hermitian Hamiltonian** = H_0.

$\mathbf{H_0} | j \rangle = E_j | j \rangle$. (j=0, 1, 2, 3....) **Eigen Equation**

$\phi(t;\mathbf{x}) = \Sigma_j c_j(t) | j;\mathbf{x} \rangle \equiv \Sigma_j c_j | j \rangle$.

$\rightarrow$ $i\hbar \partial \phi(t;\mathbf{x}) / \partial t = \mathbf{H_0} \phi(t)$.

$i\hbar \Sigma_j (\partial c_j / \partial t) | j \rangle = \mathbf{H_0} \Sigma_j c_j | j \rangle = \Sigma_j c_j E_j | j \rangle$.

$\rightarrow$. $i\hbar (\partial c_j / \partial t) = c_j E_j$.

$\rightarrow c_j(t) = c_j(0) \exp(E_j t / i\hbar)$.

$\rightarrow \phi(t;\mathbf{x}) = \Sigma_j c_j(0) \exp(E_j t / i\hbar) | j;\mathbf{x} \rangle$.

$\langle E \rangle = \langle \phi(t;\mathbf{x}) | \mathbf{H_0} | \phi(t;\mathbf{x}) \rangle = \Sigma_j | c_j(t) |^2 E_j = \Sigma_j | c_j(0) |^2 E_j$.

$\langle \Delta E^2 \rangle \equiv \langle (E^2 - \langle E \rangle)^2 \rangle > 0$.

(3)**Stationarity($\Delta t = \infty$) of Hermitian Hamiltonian ≡ H_0 Syste**m.

Thereby,observed average energy value never depend on time by hermitian H_0.

By anyhow,we can not observe any time change in above system.

(4)**None superposition state realization under hermitian Hamiltonian** ≡ H_0.

Then note time & energy uncertainty principle $\Delta t \Delta E = \hbar$.

This could not help,but conclude $\Delta E = 0$ due to $\Delta t = \infty$.

In order to realize it , $\phi(t;\mathbf{x}) = | j \rangle$, that is, unique eigen state realization,but **not those superposition state**.This is nothing,but the origin of **Schrodinger cat paradox**.

However above proof is not complete,**energy level degeneration** problem is neglected.

Even though,the conclusion could not be changed by it(→(6)).

☞:Can you really imagine **a complete stationary Hydrogen atom** with superposition states of different energy by H_0. In fact,we could only see many particles of hydrogen in fluctuated vacuum field<$H_s(t)$>,then those may be seen with energy level fluctuation with finite life time.

Those can not be with completely H_0.

(5) $\mathbf{H_0}$ Schrödinger Equation Solution for State Transition Probability Amplitude.

$i\hbar\,\partial\phi(t;\mathbf{x})/\partial t = \mathbf{H_0}\phi(t)$.

$\phi(t_0+\Delta t;\mathbf{x}) = (i\hbar)^{-1}\int_{to}^{t0+\Delta t}du\,\mathbf{H_0}\phi(t_o) \equiv (i\hbar)^{-1}\int_{to}^{t0+\Delta t}du\,\mathbf{H_0}|k\rangle = (\Delta t/i\hbar)E_k|k\rangle$

*Initial state $= \phi(t_o) \equiv |k\rangle$.

*Final state $= \phi(t_o+\Delta t) \equiv |j\rangle$.

Transition amplitude $= 0$.

$R_{jk} \equiv \langle j|(i\hbar)^{-1}\int_{to}^{t0+\Delta t}du\,\mathbf{H_0}|k\rangle = (\Delta tE_k/i\hbar)\langle j|k\rangle = (\Delta tE_j/i\hbar)\langle j|k\rangle = (\Delta tE_j/i\hbar)\,\delta_{jk}$.

In Hermitian Hamiltonian $= \mathbf{H_0}$ System, Quantum Transition is nothing !, but only keeping initial state. That is, **nothing time evolution** in the system.
That is, state transition time $\Delta t = \infty$. Thereby $\Delta E = 0$、also **nothing state superposition**.

(6) If system's Hamiltonian $= \mathbf{H_0}$ is hermite stationary as was proved in above,
the commutable variables $= \{P_r | 0 = \mathbf{H_0}\cdot P_r - P_r\cdot\mathbf{H_0}\ ;\ r = 1,2,...,M\}$| are also $\Delta P_r = 0$.
Those variables are called **maximum observable**, **conservative one**, or **good quantum numbers** in $\mathbf{H_0}$. Thus quantum state has no degenerate state of such variables$\{P_r\}$

Proof) $\mathbf{H_0}|j\rangle = E_j|j\rangle$. $\langle j=0, 1, 2, 3, \ldots\rangle$

$P_r = F_r(\mathbf{H_0}) = \sum_{m=0}^{\infty} a_{rm}(\mathbf{H_0})^m$......Taylor expansion.

Then $0 = \mathbf{H_0}P_r - P_r\mathbf{H_0}$, the commutability is evident. Thereby $\mathbf{H_0}$ and P_r have common eingen state with different eigen values.

$P_r|j\rangle = F_r(\mathbf{H_0})|j\rangle = F_r(E_j)|j\rangle \equiv P_r^{\,j}|j\rangle$.

Example) Hydrogen atom has **3 set good quantum numbers** {energy level: n = 1,2,... ;.
angular momentum: l = 0,1,..,n-1, magnet number m = -l,.....+l }.

$\Delta P_j\,\Delta Q_j \geqq \hbar/2$: uncertainty principle between canonical conjugate varible $[Q_j, P_j] = i\hbar$

Note such Q_j is time dependent variables, but not constant stationary.

$i\hbar dQ_j/dt = [Q_j, \mathbf{H_0}] \neq 0$.

If $\Delta P_j \neq 0$, then $0 < \Delta Q_j < \infty$. That is, bad qn has finite error deviation.

$q_j(t) = \langle Q_j(t)\rangle$,

and thereby time $t = Q_j^{-1}(q_j)$ are to become finite measurable with finite error.

This is contradict against $\Delta t = \infty$.

[4]: **Logical Negation conclude being of Non Hermite singular Hamiltonian**$=H_s(t)$.

Time difficulty of energy observable Hamiltonian was also pointed out by I.Prigojine the physical chemist*1).This fact was also confirmed by a colleague of Japan Physical Society(1990).

Then **logical reciprocal statement** is to declare that

Time evolution Hamiltonian $=H_S(t)$ *must be non-hermitian with indefinite energy deviation* :

$\Delta E=\infty . \rightarrow \Delta t=0.....$

It's instantaneous quantum state transition in **elementary quantum process**,
which agree with physical realities.

☞: **Frank-Condon's principle of instantaneous vertical transition of electrons cloud** ,
then heavy molecular nuclei is to slowly move toward adjusting position in the new cloud.
That is, chemical reaction is done by precedented new electrons configuration(cloud),
Heavy mass nuclei are to follow the cloud in chemical reaction in general.
However,maybe chemist did not refer this singular quantum mechanism.

https://en.wikipedia.org/wiki/Franck%E2%80%93Condon_principle

This paper seem written without strong conscious of $\Delta t=0$.

*1)Prigogine, Ilya (1980). *From Being To Becoming*. Freeman. ISBN 0-7167-1107-9.

①That $H_S(t)$ *must be non-hermitian* is indefiniteness of energy observation.

$\Delta E=\infty . \rightarrow \Delta t=0.....$

Thus time process of elementary quantum word is not classical continuous,but discontinuous something with instantaneous state transition.

②**Quantum Electrodynamics(QED)Theory** justly approve this fact !!.

$\mathcal{H}_{QED}=e\,\overline{\psi}(x)\,\gamma^{\mu}A_{\mu}(x)\,\psi(x).$

This is interaction Hamiltonian(density)of electron field= $\psi(x)$ and photon(electromagnetic field= $A_{\mu}(x)$ at time and space spot=x(x_0=ict,x_1,x_2,x_3).Then note those field operator is considered **hyper-function**(by M.Satoh)in math definition.Because those commutation relation's left side term is Dirac's delta function of hyperfunction(or distribution by L.Schwartz).Then those product at same singular point is not defined mathmatically.

That is, $\mathcal{H}_{QED}$ is not regular,but singular causing something information loss(**probability**).

$\{\psi_{\alpha}(x_0, \mathbf{x}), \psi^{*}_{\beta}(x_0, \mathbf{x}')\}^{+}=\delta_{\alpha\beta}\,\delta(\mathbf{x}-\mathbf{x}').$

https://en.wikipedia.org/wiki/Hyperfunction

③Completeness of Quantum Field Theory by Zero Volume “*Particle*” Model.

Someone say elementary matter is not particle,but ***string*** and might not trust above QED.

So called **super-string theory(SST)** is entirely fake. Standard theory of **QGD**(Quantum Gravity Dynamics)had succeeded in unifying **all interaction** and explanation of **BigBang**.

QGD is approved by the reality,while SST could not have derived any those proof.Then you may also claim standard theory employ Zero Volume “*Particle*” Model. *Zero is nothing !*.

④Real Number zero’s Incompleteness and the Gõedel Theorem.

Gõdel’s Incompleteness Theorem belongs to Probability Theory.

The simple proof of IT:"There must be incomplete proposition of which true or false never be determined in non contradictional Theory **with Natural Number Theory**".

Proof::you never can determine the largest natural number in Natural Number Theory.

☞:Note real number 0*＝lim N→∞ 1/N＝1/∞ is also indefinite, because ∞＝1/0.

☞:”0” is nothing and non-nothing simultaneously(contradictional !!).

Because u never can tell the largest number N*,so the same as for 0＝1/N*.

http://www.777true.net/Logic-the-most-simple_but-supreme-way-for-recognition.pdf

This is very important,because there are only two category in this world.
Causality Law(probability=1) and non-Causality Law(0≦probability＜1).
*probability=0 is ordinary non occurrence,however invisible vacuum physics is also zero.

⑤mechanism of the mystery going through two slit by one electron.

Real appearance of so called ***elementary particle*** is not like small biliyard ball,but may be **something bubble bursting** which burst from at a vacuum field point and instantaneously disappear,however **Quantum Wave Field with chaotic vacuum polarization one** conserve particle’s conservative variables of energy,momentum,spin,charge etc,while bad quantum number of such **bubble position is random** of here and there with **instantaneous transportation** through dipole tunneling.This is nothing,but mechanism of the mystery going through two slit by one electron.

http://www.777true.net/Real-Image-of-quantum-Chemical-Reaction.pdf

⑥Parallel running universe and the zero volume elementary particle.

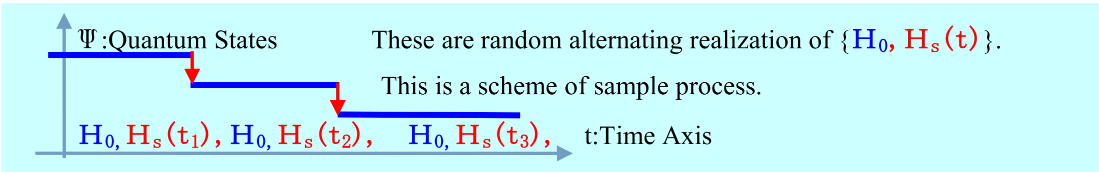
If particle had finite volume,you never can enclose too many of those in a volume,
If zero volume,those could be enclosed infinitive pieces in smallest finite volume.
QGD of multi dimensional theory proved **being of parallel running universe** in a multi-dimensional vacuum space.A localized vacuum space and time spot has infinite pieces of parts(elementary particles of zero volume)to realize everything.

[5] : Quantum Process is *Markovian*(Stochastic Process of QSM).

(1)**Statistical Ensemble**:Each sample elements has common dynamics,however each realization of state is random,but the statistics has causalitical meaning(**statistical theory**).

(2)**alternating realization of** $\{H_0, H_s(t)\}$.

In a sample process,Quantum Many Particle System is to be ruled by both Hamiltonian of $\{H_0, H_s(t)\}$.The former is state conservative,while the latter is to cause state transition by $\Delta t=0$. That is,vertical transiton.The former is unique state keeping(free particles).



Quantum Stochastic Mechanics(QSM)theory is description by ensemble meaning, but not by sample process(a realization).This is quite agree with **Equilibrium Quantum Statistical Mechanics**(E-QSM) due to maximizing Entropy in constrain conditions.

⑦Canonical Enseble with state density by **Non-biased Estimation Method＊**.

$S=k_B\Sigma_j\omega_j\ln(1/\omega_j)$. . . . . . . Entropy ; $E=\Sigma_j\omega_jE_j$. . . . . Energy

$*\ 0=(\partial/\partial\omega_j)[S-\beta E]=-k_B[\ln(\omega_j)+1]-\beta E_j.\rightarrow\omega_j=A\exp(-\beta E_j/k_B).$

$S=-k_B\Sigma_j\omega_j[-\beta E_j/k_B+\ln A]=-k_B\Sigma_j\omega_j[-\beta E_j/k_B+\ln A]=\beta E-k_B\ln A$

$1/T=\partial S/\partial E=\beta.\rightarrow\ -k_B\ln A(T)=k_B\ln\Sigma_j\exp(-E_j/k_BT).$

⑧Markov Process with State Density by **Mater Equation Methopd**.

(1) **Account Principle**.

$d\omega_j(t)/dt=\Sigma_k\Gamma_{jk}(t)\,\omega_k(t)-\Sigma_k\Gamma_{kj}(t)\,\omega_j(t).$

density change rate＝(inflow sum—outflow sum)/unit time.

(2) Γ_{jk}＝(k→j)transition probability per unit time＝$\Theta(t)T_{jk}$.

(3)**1st order State Transition Amplitude and the Probability** by S-eqn Solution：

$R_{fi}=\langle f|\int_0^{\Delta t}dt H_s(t)|/i\hbar|i\rangle.$

transition probability : $\rightarrow\ T_{fi}=R_{fi}{}^*R_{fi}.$ ⟨$1=\Sigma_f T_{fi}$. . . **normalization**⟩.

In fact,it may be hard to calculate R_{jk} ,because $H_s(t)$ is that of extremely too many body system. This theory is **too elementary to calculate**,by anyhow,so it might be necessary to **build model theory** with **something Coarse Grain Method. APPENDIX_1,2.**

☞:Even telling on coarse grain method,it is uncertain that the method could overcome calculation difficulty. A calculation experiment may be necessary by simple model.

(4)**"Evolution Principle by Energy Fluctuation"<[2]:⑦>.**

$\Theta(t)=1/\Delta t(t)=\Delta E(t)/\hbar$...... $H_s(t)$ reaction rate by Energy Fluctuation.

(5)QSM Master Equation:

(1)→ $d\omega_j/dt=\Sigma_k\Theta(t)T_{jk}\omega_k-\Sigma_k\Theta(t)T_{kj}\omega_j=\Theta(t)[\Sigma_k T_{jk}\omega_k-\omega_j]$

$d\omega_j/dt=(\Delta E(t)/\hbar)\Sigma_k[T_{jk}-\delta_{jk}]\omega_k$....... QSM Master Equation.

(6)The Solution of QSM eqn in column vector & matrix expression.

①$d\boldsymbol{\omega}(t)/dt=(\Delta E(t)/\hbar)[\mathbf{T}-\mathbf{1}]\boldsymbol{\omega}(t)$....... QSM Master Equation.

Note QSM eqn is not linear, but quasi non-linear due to $\Delta E=\Delta E(\boldsymbol{\omega})$.

Thereby,for while,we take $(\Delta E(t)/\hbar)$ is external given function $\Gamma(t)$.

②$\Theta(t)=(\Delta E(t)/\hbar)$.

③$\boldsymbol{\omega}(t)=\exp\{\int_0^t du\Theta(u)[\mathbf{T}-\mathbf{1}]\}\boldsymbol{\omega}(t_0)$.

$=\langle 1+[\mathbf{T}-\mathbf{1}]\int_0^t du\Theta(u)+[\mathbf{T}-\mathbf{1}]^2[\int_0^t du\Theta(u)]^2/2!+...+\rangle$

Or we also could take power series formation as follows.

④$\boldsymbol{\omega}(t)=\Sigma_{n=0}^{\infty}\mu_n(t)\mathbf{T}^n\boldsymbol{\omega}(t_0)$........ **Markov Chain Expansion**.

After all,equation (6) was found to be **relaxation process solution in general closed system(The 2nd law of Thermodynamics)**.

http://www.777true.net/img007-Quick-Guide-to-Quantum-Stochastic-Mechanics.pdf

(7)**Final Equilibrium State**$=\boldsymbol{\omega}_\infty$ **and Transition Matrix**$=T$.

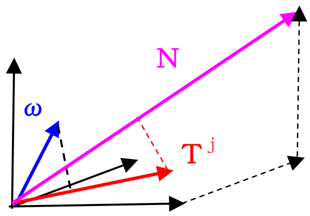
$0=d\boldsymbol{\omega}(\infty)/dt=(\Delta E(\infty)/\hbar)[\mathbf{T}-\mathbf{1}]\boldsymbol{\omega}(\infty).\to\mathbf{T}\boldsymbol{\omega}(\infty)=\boldsymbol{\omega}(\infty).(\equiv\boldsymbol{\omega}_\infty)$.

$\boldsymbol{\omega}(\infty)$ could be derived by **equilibrium statistical mechanics**.Then a most simple transition matrix is below,however this seems not quantum transition probability.

$\mathbf{T}=[\boldsymbol{\omega}_\infty,\boldsymbol{\omega}_\infty,\boldsymbol{\omega}_\infty....,\boldsymbol{\omega}_\infty]$.

http://www.rs.noda.tus.ac.jp/skimura/AppMath3/AppMathIII-7.pdf

There are many possible solutions for **probability matrix** $T\equiv T_{jk}$.



$\Sigma_k\equiv\omega_k=\omega_j$...... $(j=0,1,2,....,N-1).\to\langle\mathbf{T}^j\cdot\boldsymbol{\omega}\rangle=\omega_j$.

$\Sigma_k T_{jk}=1$.......... $(j=0,1,2,....,N-1).\to\langle\mathbf{T}^j\cdot\mathbf{N}\rangle=1$.

$\mathbf{T}^j\equiv[T_{j0},T_{j1},...,T_{jN-1}]..(j=0,1,2,....,N-1)$.

$\mathbf{N}\equiv[1,1,...,1]$.

The elements number of $T=N^2$. Constrained Equations are $2N$,thereby,undetermined elements $F=N^2-2N\gg 1$. So those are insufficient to determine at all.

⑻**Non Closed Inequilibrium System with Flows**.

Logical reciprocal statement is **Non Closed Inequilibrium System**,
which is to reveal realization of inequilibrium state far from equilibrium one.
http://www.777true.net/img007-Quick-Guide-to-Quantum-Stochastic-Mechanics.pdf

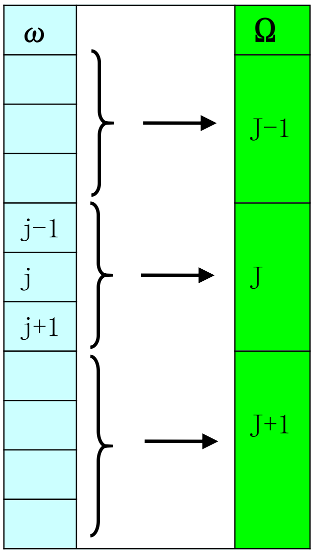
⑼**Quantum Process is Markovian.**

In the former theory,quantum process had not been being recognized as **Markovian**.That is, wrong **superposition state process** due to misunderstanding that Schrodinger Equation is linear one allowing quantum superposition state.Also **perturbation theory** in Quantum Field Theory is due to lack of recognition on Markovian.As the consequence,so called **difficulty of divergence(re-normalization problem)**was caused due to overestimation in calculating quantum process. **A righteous Theory must be Unique with Finiteness**(Gõdel Completeness Theorem).

⑽**Postscript:**

About 1990,theory of QSM eqn and the some solutions had been accomplished.Then author faced the difficulty of solving QSM eqn and turned other fields.Especially in 1993～1995,he engaged research on Quantum Gravity Dynamics(QGD).Also business failure in QGD,once again he had to turn his job one after another till today.
Now author is old enough,so younger generation's trying QSM is expected.

APPENDIX_1：Reviving Master Equation in Transform by Coarse Grain Method for Primitive Quantum States.



Left side is a model of primitive quantum states{ω},which should be called fine cells,while right side is a model of coarse grained quantum states{Ω}(=coarse cellls).The each of latter are **local averaged primitive states**.

As you could see in below,**transition probability rate** can also be re-defined as coarse grainning of averaging.This may be tautology in re-definition of Markov process for new state assignment.

$d\omega_j(t)/dt = \Sigma_k \Gamma_{jk}(t)\,\omega_k(t) - \Sigma_k \Gamma_{kj}(t)\,\omega_j(t).$

→ $\Omega_J(t) \equiv N_J^{-1} \Sigma_{j\in J}\, \omega_j(t)$............ **Coarse Grain State as Local Averaging.**

$j \in J \equiv \{j-n_J/2, ..., j, ..., j+n_J/2\}$.... (even number $n_J > 2, N_J = n_J+1$)

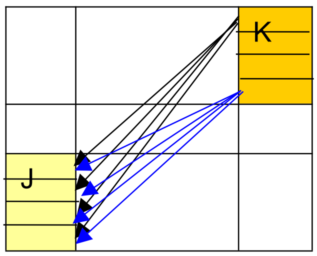
$(d/dt)\,\Omega_J = N_J\, \Sigma_{j\in J} (d/dt)\,\omega_j = N_J\, \Sigma_{j\in J}\{\Sigma_k \Gamma_{jk}\omega_k - \Sigma_k \Gamma_{kj}\omega_j\}$

$\Sigma_{j\in J}\Sigma_k \Gamma_{jk}\omega_k = \Sigma_{j\in J}\Sigma_K \Gamma_{jK}\omega_K.$ → $\Gamma_{jK}\Omega_K \equiv \Sigma_{k\in K}\Gamma_{jk}\omega_k.$

$\Gamma_{jK}\equiv \Sigma_{k\in K}\Gamma_{jk}\omega_k/\Omega_K.$ → $\Sigma_{j\in J}\Sigma_K\Gamma_{jK}\Omega_K = \Sigma_K \Gamma_{JK}\Omega_K.$

→ $\Gamma_{JK} \equiv \Sigma_{j\in J}\Gamma_{jK} \equiv \Sigma_{j\in J}(\Sigma_{k\in K}\Gamma_{jk}\omega_k/\Omega_K).$

→ $\Gamma_{JK}\equiv\Sigma_{j\in J}(\Sigma_{k\in K}\Gamma_{jk}\omega_k/\Omega_K)$......... **Coarse Grain Transition Probability Rate.**



Coarse grained transition probability rate is seen in left fig. After all,master equation method is due to very primitive principle of **account one**,which is **tautology**,so reving master equation by **state re-definition** by coarse grain method is also tautology.

Thus we could once again rerive coarse grained Master Equation.

$d\Omega_J(t)/dt = \Sigma_K \Gamma_{JK}(t)\,\Omega_K(t) - \Sigma_K \Gamma_{KJ}(t)\,\Omega_J(t).$

APPENDIX_２：Reviving Master Equation in Transform by Coarse Grainning on Time Axis.

$\Omega_J(t+\Delta t)-\Omega_J(t)=\Sigma_K\int_t^{t+\Delta t}du.\ \Gamma_{JK}(u)\,\Omega_K(u)-\Sigma_K\int_t^{t+\Delta t}du.\ \Gamma_{KJ}(u)\,\Omega_J(u).$

$=\Sigma_K\Omega_K(u')\int_t^{t+\Delta t}du.\ \Gamma_{JK}(u)-\Sigma_K\Omega_J(u')\int_t^{t+\Delta t}du.\ \Gamma_{KJ}(u)......(t+\Delta t>u'>t)$

$<(d/dt)\,\Omega_J(t)>\equiv\int_t^{t+\Delta t}du.\ (d/dt)\,\Omega_J(u)/\Delta t=(d/dt)\,\Omega_J(u')/\Delta t$

$=\Sigma_K\Omega_K(u')<\int_t^{t+\Delta t}du.\ \Gamma_{JK}(u)/\Delta t>-\Sigma_K\Omega_J(u')<\int_t^{t+\Delta t}du.\ \Gamma_{KJ}(u)/\Delta t>.$

Certainly yellow portions＝u' are rather indefinite,however those may approximately be u'$=t+\Delta t/2$ due to estimation on local linearity in contieneous process.

Thus,by averaging in short time interval operation<...>,

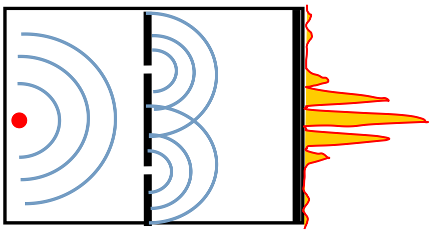
We could revive Master Equation twice again by short time interval averaging.

$d<\Omega_J(t)>/dt=\Sigma_K<\Gamma_{JK}(t)><\Omega_K(t)>-\Sigma_K<\Gamma_{KJ}(t)><\Omega_J(t)>.$

☞:**Due to coarse grainning possibility on states and time**, QSM does need to be theory not only for **elementary process** ,but also for **coarse grained process**.Author has no actual and concrete experience on **non-equilibrium physical chemical system analysis**, so he expect you concerning those problems could synthesize state assignment$\{\Omega_J\}$ and transition rate matrix$<J_{FK}(t)>$. The latter is composed from basic {**reaction Hamiltonian** $=H_s$ and **system energy fluctuation**$=\Delta E$}.

APPENDIX_3 :

Paradox of 2 Slit Difraction Pattern by 1 Electron. (bad **qn** observation)



Red dot is wave source,which radiates wave toward 2 slits,from where 2ndary wave reradiate.Those hit strong and weak dots=**diffraction pattern** at the black screen by 2 wave superpostion.

The mystery is revealed by radiating a constant momentum electron one by one,even such weak beam can show diffraction pattern by long time dots accumulation on screen.Then can **an electron** go through W slit **at the same time** ??, or one slit only ??.If one slit only ,then shutting a slit never realize diffraction pattern.Electron wave function ϕ is superposition of eigen function of **position observable** $x\delta(\mathbf{x-x'})=x'\delta(\mathbf{x-x'})$.$\rightarrow \phi(x)=\int dx'\exp<(Et-\mathbf{px'})/i\hbar>\delta(\mathbf{x-x'})$.

Double slit going never be understand by **classical continuos movement**,but the logical negating as electron popping up movement by discontinuous random & instantaneous .

This is due to perpetual interaction reactions with **quantum vacuum**(dipole tunneling).

http://www.777true.net/Real-Image-of-quantum-Chemical-Reaction.pdf

APPENDIX_4 :

Paradox of Schröodinger's Cat≡SC(good **qn** observation).

https://www.youtube.com/watch?v=JNalMWLnt0o

An electron shows non localized wave dynamics as showed in above,howeve it is also localized an electron when it interact with screen collision(**w**ave **p**acket **c**onversion(=WPC)by observation <bad qn=**active measurement**>). $\phi=\exp((Et-\mathbf{px})/i)$.$\rightarrow \phi=\delta(x-x')$.

Essential mechanism in SC is spontaneous γ ray emitting in radioactive atoms(=RA).It is **passive observation** on quantum state of RA before emitting(Ψ_b=cat alive),or after emitting(Ψ_a=cat died).Passive measurement means that information comes by spontaneous interaction (catching γ ray emitting),and this process does not need manmade Interaction to cause instanteneous state transition,but the state transition is decided by observed target ownself.That is,death or alive of cat never depend on our observing.**Copenhagen Interpretation** in passive measurement is not correct.Shrodinger's critique is right.**Common sense is also right !**

While **active measurement** needs man made injecting something to interact with observing target(causing state transition or wave packet convergence)in order to emit information coming(reflection photon with electron position infomation in **active measurement**).

ref)鈴木基司、量子確率過程力学、時事問題解析工房, 1990.

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