時事問題解析工房出版物の訂正補足通知。

過去出版物リスト(著者=鈴木基司)：2017/4/21

⑴量子確率過程力学、　　　　　　時事問題解析工房、初版1990→最終版1996

⑵(上記英文版在り)

⑶非局所的双極子場の量子論<改定中>，時事問題解析工房、1992.

⑷構造的物理認識の為の連続値論理学、時事問題解析工房、1992→1996.

⑸量子重力力学と最終統一場論、　　時事問題解析工房、1993→1997.

＊上記量子物理学全般＋数学等の要綱公式集私用マニュアル file 本在り、

⑹思考推進言語と真相世界、　　　　時事問題解析工房、1993→1997.

⑺現代物理科学最前線、　　　　　　時事問題解析工房、1998→1999.

⑻経済回路網力学,　　　　　　　　時事問題解析工房、1998.

⑼縦波電位波発電の理論と実現,　　時事問題解析工房、2003.

⑽新量子物理学の一般紹介本(1995) → 原稿盗難（ファイル４冊)、

　高校上級,大学教養程度の基礎数学&物理を前提、

＊ アナログ録音機ワ-プロ保存デ-タ在り、だがワ-プロ修理不能で放置状態、

　マシン＝サンヨ-ＳＷＰ　M12

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*原稿文のスキャナ読み取りでワード形式変換の可能性？

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⑴量子確率過程力学(1996).→p76.

$|\Upsilon(\Delta u;t)|=[1-(\Delta u \Delta \varepsilon/\hbar)^2]^{1/2}$.　　　　　(6-3-21)

誤箇所☠：$\sqrt{(1-x^2)}=1-x$.　→　詳細訂正内容は次3ページ、本筋結論は不変です。

⑸量子重力力学と最終統一場論(1997).→p23.

誤箇所☠：$R^Q=\Pi_{a,\mu,\nu,x}\int DA^a_\mu \int D\Pi^a_\nu \int DB^a \int Df^a \cdot \Delta \cdot \delta(ic\partial_\mu A^a_\mu - f^a)$
$\exp[\int dx^4 \langle \mathcal{L}_{CF}/i\hbar \rangle]\cdot\exp[\int dx^4(B^a f^a+½aB^aB^a)/i\hbar]$

→　訂正内容

$R^Q=\Pi_{a,\mu,\nu,x}\int D\varepsilon^a \cdot \int DA^a_\mu \int D\Pi^a_\nu \int DB^a \int D\overline{C}^a \int DC^a \cdot\exp[\int dx^4 \langle \mathcal{L}_{CF}/i\hbar \rangle]\cdot$
$\delta(ic\partial_\mu A^a_\mu - f^a)\cdot\exp[\int dx^4(B^a f^a+½aB^aB^a)/i\hbar]\cdot\exp[\int dx^4\cdot \chi \overline{C}^a(x)\cdot ic\partial_\mu D_\mu C^a(x)/i\hbar]$

→　詳細補足訂正内容は次ページ、本筋結論は不変です。

[２]：Time & Energfy Uncertainty Relation by the Statistical Mathematics：

"Evolution Principle by Energy Fluctuation".

*Time domain **Corelation Function** is measure for function shape similarity 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: $T(t)\equiv[t-\square T/2,\ t+\square T/2]$.

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**: $\omega(\varepsilon;t)\equiv\langle c(\varepsilon;t)|c(\varepsilon;t)\rangle/\square T$

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

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

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

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

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

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

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

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**$1\geqq|\Upsilon(\Delta t;t)|\geqq0$ 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=$\Psi(t+\Delta t)$.

[２]:⑦Energy and Time Uncertainty Principle.

"Evolution Principle by Energy Fluctuation".

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

ΔE=**energy deviation** in statistical ensemble.

Δt=**transition time** in statistical ensemble by ΔE.

APPENDIX3:Deriving FP Lagrangean by Path-Integral. 2017/4/10

Gauge Covariant Quantized Lagrangean must be with $0=ic\partial_\mu D_\mu \varepsilon^a$,which is kernel.
Feyman Path Integral, Variable transform and Jacobian in integral calculation are tools.
Consequently,we derive Faddev-Popov Lagrangean term in **Gauge Field Quantization**.
*This is alternative of **[5] : Quantized Lagrangean of {$\bar{C}^a$.C^a}<FP Gohst>.**

*L.D.Faddeev and V.N.Popov:Pphys Lett.25B(1967)29.
"Feynman Diagram for The Yang-Mills Field"
Feynman, R. P. (1948). *Reviews of Modern Physics*. **20 (2): 367–387.
"Space-Time Approach to Non-Relativistic Quantum Mechanics".

[1] : Schrödinger EQN Solution by Path-Integral.

(1)$i\hbar\partial_t\Psi(t)=\mathbf{H}(t)\Psi(t)$. → $\Psi(t+\Delta t)=[1+\Delta t/i\hbar)\mathbf{H}(t)]\Psi(t)$

Difficulty of time & energy variable by uncertainty principle(UP) in Quantum Mechanics.

$\mathbf{H}(t)$ is energy observable,while (t) is time,which are ruled by UP($\Delta E\Delta t=\hbar$).Thereby,both can not be determined simultaneously without 0 error.Discussion at here is to neglect the fact(classical calculation),so It is inevitable to face **some difficulty** to derive definite result.
http://www.777true.net/img007-Quick-Guide-to-Quantum-Stochastic-Mechanics.pdf

☞:time at here is mere events sequence parameters $t_j>t_{j-1}$,but not time value.

(2)$\Psi(t_0+n\Delta t=t)=[1+(\Delta t/i\hbar)\mathbf{H}(t_0+\langle n-1\rangle\Delta t)]\Psi(t_0+\langle n-1\rangle\Delta t))$

$\Psi(t_0+\langle n-1\rangle\Delta t))=[1+(\Delta t/i\hbar)\mathbf{H}(t_0+\langle n-2\rangle\Delta t)]\Psi(t_0+\langle n-2\rangle\Delta t))$

. . . . $\Psi(t_0+\Delta t)=[1+(\Delta t/i\hbar)\mathbf{H}(t+0\Delta t)]\Psi(t_0+0.\ \Delta t=t_0))$.

$\Psi(t)=n\to\infty[1+(\Delta t/i\hbar)\mathbf{H}(t_{n-1})]\times[1+(\Delta t/i\hbar)\mathbf{H}(t_{n-2})]\times....\times[1+(\Delta t/i\hbar)\mathbf{H}(t_j)]\times$
$\times[1+(\Delta t/i\hbar)\mathbf{H}(t_1)]\times[1+(\Delta t/i\hbar)\mathbf{H}(t_0)]\Psi(t_0)\equiv\mathbf{S}(t;t_0)\Psi(t_0)$

$R_{fi}\equiv\langle\Psi(t)|\mathbf{S}(t;t_0)|\Psi(t_0)\rangle\equiv$transition probability amplitude from $\Psi(t_0)\to\Psi(t)$.

(3)Representation by $(\mathbf{Q};\mathbf{P})$ Space and Momentum Observable's Eingen Function Set.

(a)$\mathbf{P}|p\rangle=-i\hbar\partial_q|\exp(-pq/i\hbar)\rangle/\sqrt{(2\pi\hbar)}\rangle$.
$\langle p'|p\rangle=\int_{-\infty}^{\infty}dq\exp(p'q/i\hbar)\exp(-pq/i\hbar)/(2\pi\hbar)=\delta(p-p')$.

(b)$\mathbf{Q}|q\rangle=q'\delta(q-q')$.

(c)$\langle q|p\rangle\equiv\int dq'\delta(q-q')\exp(-pq'/i\hbar)\rangle/\sqrt{(2\pi\hbar)}\rangle\equiv\exp(-pq/i\hbar)\rangle/\sqrt{(2\pi\hbar)}\rangle$.
$\langle p|q\rangle\equiv\int_{-\infty}^{\infty}dq'\delta(q-q')\exp(pq'/i\hbar)\rangle/\sqrt{(2\pi\hbar)}\rangle\equiv\exp(pq/i\hbar)\rangle/\sqrt{(2\pi\hbar)}\rangle$.

(d)**unit operator** $1\equiv\int dq|q\rangle\langle q|=\int dq|p\rangle\langle p|$;

(4)**QP representation of** $S(t;t_0)$.

$S(t;t_0) = \int dq_{n-1}|q_{n-1}\rangle\langle q_{n-1}|[1+(\Delta t/i\hbar)\mathbf{H}(t_{n-1})]\int dp_{n-1}|p_{n-1}\rangle\langle p_{n-1}|$

$\times\int dq_{n-2}|q_{n-2}\rangle\langle q_{n-2}|[1+(\Delta t/i\hbar)\mathbf{H}(t_{n-2})]\int dp_{n-2}|p_{n-2}\rangle\langle p_{n-2}|\times$

....

$\times\int dq_j|q_j\rangle\langle q_j|[1+(\Delta t/i\hbar)\mathbf{H}(t_j)]\int dp_j|p_j\rangle\langle p_j|\times$

......

$\times\int dq_1|q_1\rangle\langle q_1|[1+(\Delta t/i\hbar)\mathbf{H}(t_1)]\int dP_1|p_1\rangle\langle p_1|$

$\times\int dq_0|q_0\rangle\langle q_0|[1+(\Delta t/i\hbar)\mathbf{H}(t_0)]\int dp_0|p_0\rangle\langle p_0|$

$\times\int dq_{-1}|q_{-1}\rangle\langle q_{-1}|$

$S(t;t_0) = \Pi_{j=-1}^{n-1}\int dq_j\Pi_{j=0}^{n-1}\int dp_j|q_{n-1}\rangle\langle q_{-1}|$

$\times\{\Pi_{j=0}^{n-1}\langle q_j|[1+(\Delta t/i\hbar)\mathbf{H}(t_j)]|p_j\rangle\langle p_j|q_{j-1}\rangle\}$

$*\langle q_j|[1+\Delta t/i\hbar)\mathbf{H}(t_j)]|p_j\rangle\langle p_j|q_{j-1}\rangle = [\langle q_j|p_j\rangle + \Delta t/i\hbar)\langle q_j|\mathbf{H}(t_j)|p_j\rangle]\langle p_j|q_{j-1}\rangle$

$=[\exp(-q_jp_j/i\hbar)\rangle/\sqrt{}(2\pi\hbar) + (\Delta t/i\hbar)\langle q_j|\mathbf{H}(t_j)|p_j\rangle]\exp(p_jq_{j-1}/i\hbar)\rangle/\sqrt{}(2\pi\hbar)$

$=\exp(-p_j\langle q_j-q_{j-1}\rangle/i\hbar)/(2\pi\hbar) + (\Delta t/i\hbar)\langle q_j|\mathbf{H}(t_j)|p_j\rangle]\exp(p_jq_{j-1}/i\hbar)\rangle/\sqrt{}(2\pi\hbar)$

$=\exp(-p_j\langle q_j-q_{j-1}\rangle/i\hbar)/(2\pi\hbar)[1+(\Delta t/i\hbar)\langle q_j|\mathbf{H}(t_j)|p_j\rangle]\exp(p_jq_j/i\hbar)\rangle\sqrt{}(2\pi\hbar)]$

$*$ <usefurl formula: $1+\delta X = \exp(\delta X)$>

$*\exp(-p_j\langle q_j-q_{j-1}\rangle/i\hbar) = \exp(-\Delta t.\, p_j(dq_j/dt)/i\hbar)$.

$**|p_j'\rangle = \exp(-p_j'q_j/i\hbar)/\sqrt{}(2\pi\hbar). \to \langle p'|p\rangle = \delta(p-p')$.

$\langle q_j|\mathbf{H}(j)|p_j\rangle\sqrt{}(2\pi\hbar)\exp(p_jq_j/i\hbar) = \int dq_j'\mathbf{H}(q_j;p_j)\delta(q_j-q'_j)\exp(p_jq_j/i\hbar)\exp(-p_jq'_j/i\hbar)$

$=\mathbf{H}(q_j;p_j)$.

$=(2\pi\hbar)^{-1}.\exp[-(\Delta t//i\hbar).\,p_j(dq_j/dt)]\exp[(\Delta t/i\hbar).\,\mathbf{H}(q_j;p_j)]$

$=(2\pi\hbar)^{-1}.\exp[-(\Delta t/i\hbar)\langle\mathscr{L}(q_j;dq_j/dt)\rangle]$. <usefurl formular: $1+\delta X = \exp(\delta X)$>

$S(t;t_0) = \Pi_{j=-1}^{n-1}\int dq_j\Pi_{j=0}^{n-1}\int dp_j|q_{n-1}\rangle\langle q_{-1}|$

$\times\{\Pi_{j=0}^{n-1}(2\pi\hbar)^{-n}.\exp[-(\Delta t/i\hbar)\langle\mathscr{L}(q_j;dq_j/dt)\rangle]$.

$=\Pi_{j=-1}^{n-1}\int dq_j\Pi_{j=0}^{n-1}\int(dp_j/2\pi\hbar)\cdot|q_{n-1}\rangle\langle q_{-1}|^n.\exp[-\int dt\langle\mathscr{L}(q_j;dq_j/dt)/i\hbar\rangle]$

$\equiv|f\rangle\langle i|\int Dq_j\int Dp_j.\exp[-\int dt\langle\mathscr{L}(q;dq/dt)/i\hbar\rangle]$..... **this is the orgin definition !!**

(4)**Quantum Amplitude** $=R_{fi}$ **by Feymann Path Integral .**

$\mathbf{S}(t;t_0) = |f\rangle\langle i|\int_{-\infty}^{\infty}Dq\int_{-\infty}^{\infty}Dp.\exp[-\int_{t0}^{t}dt\langle\mathscr{L}(q;dq/dt)/i\hbar\rangle]$.

$R_{fii} = \langle f|\mathbf{S}(t;t_0)|i\rangle$.

Operator part is $|f\rangle\langle i|$,the other are scalar term. This is not path-integral,but whole phase space one !.

[2] : Gauge Fixing by Path-Integral.

(1) $\mathcal{L}_{CF} \equiv -\frac{1}{4}(\partial_\mu A^a{}_\nu - \partial_\nu A^a{}_\mu - f_b{}^a{}_c A^b{}_\mu A^c{}_\nu)^2 \equiv -\frac{1}{4} F^a{}_{\mu\nu} F^a{}_{\mu\nu}$.

$\mathcal{L}_{QF} \equiv \mathcal{L}_{CF} + \mathcal{L}_B = (ic)^{-1} B^a \partial_\mu A^a{}_\mu + \frac{1}{2}\alpha B^a B^a$.

(2) $0 = (ic)^{-1} \partial_\mu A^a{}_\mu + \alpha^a B^a$.

The Euler Equation (2) must be gauge invariant by $\delta A^a{}_\mu$.

(3) $0 = ic\,\partial_\mu A^a{}_\mu + \alpha B^a = ic\,\partial_\mu (A^a{}_\mu + \delta A^a{}_\mu) + \alpha B^a = ic\,\partial_\mu \delta A^a{}_\mu = ic\,\partial_\mu D_\mu \varepsilon^a = 0$. . . . . .

(4) $R_{CF} \equiv |f\rangle\langle i| \Pi_{a,\mu,x} \int D A^a{}_\mu \int D\Pi^a{}_\nu . \exp[-\int dx^4 \langle \mathcal{L}_{CF}(A^a{}_\mu ; \partial_\nu A^a{}_\mu)/i\hbar\rangle]$.

(5) **The Aim of Problem.**

At first,note that gauge transform never change observable physics.

In above,the integration $D A^a{}_\mu$ is to over-count due to gauge transform∞freedom,thereby **gauge fixing** by $\delta\,(ic\,\partial_\mu D_\mu \varepsilon^a)$ must be multiply the integral kernel to R_{CF} .However the compensation$=\Delta$ is simultaneously necessary toward being unity. $\int d\varepsilon\,\delta\,(k\varepsilon) = 1/|k|$.

(5) $1 = \Pi_{a,\mu,x} \int D\varepsilon^a \cdot \Delta \cdot \delta\,(ic\,\partial_\mu D_\mu \varepsilon^a)$.

(6) Review on **measure compensation=Jacobian** in integral variable transform.

http://tutorial.math.lamar.edu/Classes/CalcIII/ChangeOfVariables.aspx

$\Rightarrow y^b = f^b(t^1, t^2, \ldots, t_N). \Leftrightarrow \quad t^a = g^a(y^b) = f^{a-1}(y^b).$ $\langle a, b = 1, 2, 3, \ldots, N\rangle$

$\Pi_a dt^a = \Pi_b dy^b \cdot \det|\partial g^a/\partial y^b| = \Pi_b dy^b \cdot \det|\partial f^a/\partial y^b|^{-1}$.

$\Pi_a \int dt^a\,\delta\,[f^1(t^1, t^2, .), f^2(.), .] = \Pi_b \int dy^b\,\delta\,(y^1, y^2, .) \det|\partial f^a/\partial y^b|^{-1} = \det|\partial f^a/\partial y^b|^{-1}$.

$\Rightarrow 1 = \Pi_a \int dt^a\,\delta\,(f^1(t^1, t^2, ., .), f^2(.), .) \det|\partial f^a/\partial y^b|. \Rightarrow$ $\Delta = \det|\partial f^a/\partial y^b|$ . . . . (6)

(7) Deriving Δ.

(3) $0 = ic\,\partial_\mu A^a{}_\mu + \alpha B^a = ic\,\partial_\mu (A^a{}_\mu + \delta A^a{}_\mu) + \alpha B^a = ic\,\partial_\mu \delta A^a{}_\mu = ic\,\partial_\mu D_\mu \varepsilon^a = 0$. . . . .

$ic\,\partial_\mu D_\mu \varepsilon^a \equiv f^a. \rightarrow \quad \varepsilon^a = (ic\,\partial_\mu D_\mu)^{-1} f^a$.

$\rightarrow \Pi_{a,} D\varepsilon^a = \Pi_b D f^b \cdot \det|\partial\{(ic\,\partial_\mu D_\mu)|^{-1} f^b\}/\partial f^b\}| = \Pi_b D f^b \cdot \det|(ic\,\partial_\mu D_\mu)|^{-1}$.

$\rightarrow \Pi_{a,} D\varepsilon^a = \Pi_b D f^b \cdot \det|(ic\,\partial_\mu D_\mu)|^{-1}$. . . . . (7)'.

$\Rightarrow 1 = \Pi_{a,x} \int D\varepsilon^a \cdot \delta\,(ic\,\partial_\mu D_\mu \varepsilon^a) \cdot \det|(ic\,\partial_\mu D_\mu)|. \quad \Rightarrow \quad \Delta = \det|ic\,\partial_\mu D_\mu|$ . . . . (7)

Above relation is to be changed as follows.This is very important.

☞: *Note we take technic<(7)'> in following doing integration on variables* $=\{\varepsilon^a ; f^a = f^a(\varepsilon^a)\}$.

$1 = \Pi_{a,x} \int Df^a \cdot \delta\,(-f^a) = \Pi_{a,x} \int Df^a \cdot \delta\,(ic\,\partial_\mu A^a{}_\mu - f^a)$

$= \Pi_{a,x} \int \Delta^{-1} \cdot Df^a \cdot \delta\,(ic\,\partial_\mu A^a{}_\mu - f^a) \cdot \Delta = \Pi_{a,x} \int D\varepsilon^a \cdot \delta\,(ic\,\partial_\mu A^a{}_\mu - f^a) \cdot \Delta$.

(8)Gauss Fresnel Integral Formula< $\int dx \cdot \exp(-ax^2/2) = \sqrt{(2\pi/a)}$ >.

$*\int dx \cdot \exp(-iax^2/2) = \sqrt{(2\pi/ia)}$; $*\int dx \cdot \exp(ix^2/2a) = \sqrt{(2\pi ia)}$.

$\sqrt{(2\pi/ia)} = \int dB \cdot \exp(-ia(f/a+B)^2/2) = \int dB \cdot \exp[-i(f^2/2a+Bf+½aBB)]$

$= \int df \exp[-i(f^2/2a] \int dB \cdot \exp[-i(Bf+½aBB)]$.

$2\pi = \sqrt{(2\pi/ia)} \int df \exp[i(f^2/2a] = \int df \int dB \cdot \exp[-i(Bf+½aBB)]$.

$\rightarrow \quad 1 = (2\pi\hbar)^{-1} \int df \int dB \cdot \exp[-i(Bf+½\alpha BB)/i\hbar]$. $\quad \langle a = \alpha/\hbar;\ f' = f/\hbar \rangle$

(8) $\quad 1 = \Pi_{a,x} \int Df^a \int dB^a \cdot \exp[\int dx^4 (B^a f^a + ½aB^a B^a)/i\hbar]$.

By employing variable $f^a(\varepsilon^a)$,we are to do integral on the delta function.

(9)Gauss Integral Formula with Grassmann number $= \{\overline{C}^a, C^a\}$

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

Grassmann number definition: $\overline{C}^a \cdot C^a + C^a \cdot \overline{C}^a = 0$.

*This is **classical number-zation** of anti-commutable spinor ϕ.

$\phi^* \phi + \phi \phi^* = i\hbar\delta(\mathbf{x'}-\mathbf{x})$.

$\det \mathbf{A} = \Pi_{a,x} \int D\overline{C}^a \int DC^a \exp[\int dx^4 \cdot \overline{C}^a(x) \mathbf{A} C^a(x)]$.

(9) $\quad \Delta = \det|ic\partial_\mu \mathbf{D}_\mu| = \Pi_{a,x} \int D\overline{C}^a \int DC^a \exp[\int dx^4 \cdot \chi \overline{C}^a(x) \cdot ic\partial_\mu \mathbf{D}_\mu C^a(x)/i\hbar$.

(10)**Total Quantized Lagragean of General Gauge Field.**

Ⅰ : $R_{CF} \equiv |f\rangle\langle i| \Pi_{a,\mu,\nu,x} \int DA^a_\mu \int D\Pi^a_\nu . \exp[\int dx^4 \langle \mathcal{L}_{CF}(A^a_\mu; \partial_\nu A^a_\mu)/i\hbar\rangle]$.

Ⅱ : $\Delta = \det|ic\partial_\mu \mathbf{D}_\mu| = \Pi_{a,x} \int D\overline{C}^a \int DC^a \exp[\int dx^4 \cdot \chi \overline{C}^a(x) \cdot ic\partial_\mu \mathbf{D}_\mu C^a(x)/i\hbar]$.

Ⅲ : $1 = \Pi_{a,x} \int D\varepsilon^a \int dB^a \cdot \delta(ic\partial_\mu A^a_\mu - f^a) \exp[\int dx^4 (B^a f^a + ½aB^a B^a)/i\hbar] \cdot \Delta$.

After all,multiplying (Ⅲ)×(Ⅰ)is to yield the total Lagrangean.

We do integration on the delta function by $\{D\varepsilon^a\}$.

$R_{QF} = \Pi_{a,\mu,\nu,x} \int D\varepsilon^a \cdot \int DA^a_\mu \int D\Pi^a_\nu \int DB^a \int D\overline{C}^a \int DC^a \cdot \exp[\int dx^4 \langle \mathcal{L}_{CF}/i\hbar\rangle] \cdot$

$\delta(ic\partial_\mu A^a_\mu - f^a) \cdot \exp[\int dx^4 (B^a f^a + ½aB^a B^a)/i\hbar] \cdot \exp[\int dx^4 \cdot \chi \overline{C}^a(x) \cdot ic\partial_\mu \mathbf{D}_\mu C^a(x)/i\hbar]$

$= \Pi_{a,\mu,\nu,x} \int DA^a_\mu \int D\Pi^a_\nu \int DB^a \int D\overline{C}^a \int DC^a \cdot \exp[\int dx^4 \langle \mathcal{L}_{CF}/i\hbar\rangle]$

$\cdot \exp[\int dx^4 (ic\partial_\mu A^a_\mu B^a + ½aB^a B^a)/i\hbar] \cdot \exp[\int dx^4 \cdot \chi \overline{C}^a(x) \cdot ic\partial_\mu \mathbf{D}_\mu C^a(x)/i\hbar]$.

$= \Pi_{a,\mu,\nu,x} \int DA^a_\mu \int D\Pi^a_\nu \int DB^a \int D\overline{C}^a \int DC^a \cdot$

$\exp[\int dx^4 \langle \mathcal{L}_{CF} + ic\partial_\mu A^a_\mu B^a + ½aB^a B^a + \chi \overline{C}^a(x) \cdot ic\partial_\mu \mathbf{D}_\mu C^a(x)\rangle/i\hbar]$.

(10) $\mathcal{L}_{QF} = \mathcal{L}_{CF} + ic\partial_\mu A^a_\mu B^a + ½aB^a B^a + \chi \overline{C}^a(x) \cdot ic\partial_\mu \mathbf{D}_\mu C^a(x)$. $\mathcal{L}_{CF} \equiv -¼F^a_{\mu\nu} F^a_{\mu\nu} \equiv -¼(\partial_\mu A^a_\nu - \partial_\nu A^a_\mu - f_b{}^a{}_c A^b_\mu A^c_\nu)^2$.