Title: Focus Lecture

Date: Jul 21, 2016 05:00 PM

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Abstract:

$$\rho_2(x_2,\bar{x}_2) = \int_{-\infty}^{+\infty} dx_1 \, \underbrace{\psi_0(x_1,x_2)\,\psi_0^*(x_1,\bar{x}_2)} = \frac{(\gamma-\beta)^{1/2}}{\sqrt{\pi}} \exp\left[-\frac{\gamma}{2}\left(x_2^2+\bar{x}_2^2\right) + \beta x_2 \bar{x}_2\right]$$

$$\parallel$$

$$\langle \bar{x}_2 | \rho_2 | x_2 \rangle = \mathrm{Tr}_1\, \rho = \mathrm{Tr}_1 |0\rangle\langle 0| = \int dx_1 \, \langle x_1, \bar{x}_2 | 0 \rangle \langle 0 | x_1, x_2 \rangle$$

$$\beta = \frac{(\omega_+ - \omega_-)^2}{4(\omega_+ + \omega_-)}$$

$$\gamma = \beta + \frac{2\omega_+\omega_-}{\omega_+ + \omega_-}$$

$$\int_{-\infty}^{+\infty} d\bar{x}\, \rho(x,\bar{x})\, f_n(\bar{x}) = p_n f_n(x)$$

$$f_n(x) = e^{-\frac{\alpha x^2}{2}} H_n(\sqrt{\alpha}\, x) \qquad \alpha = \sqrt{\gamma^2-\beta^2} = \sqrt{\omega_+\omega_-}$$

$$p_n = (1-\xi)\xi^n \qquad n = 0, 1, \dots \qquad \xi = \frac{\beta}{\gamma+\alpha} < 1$$

3 checks: $k_1 = 0$

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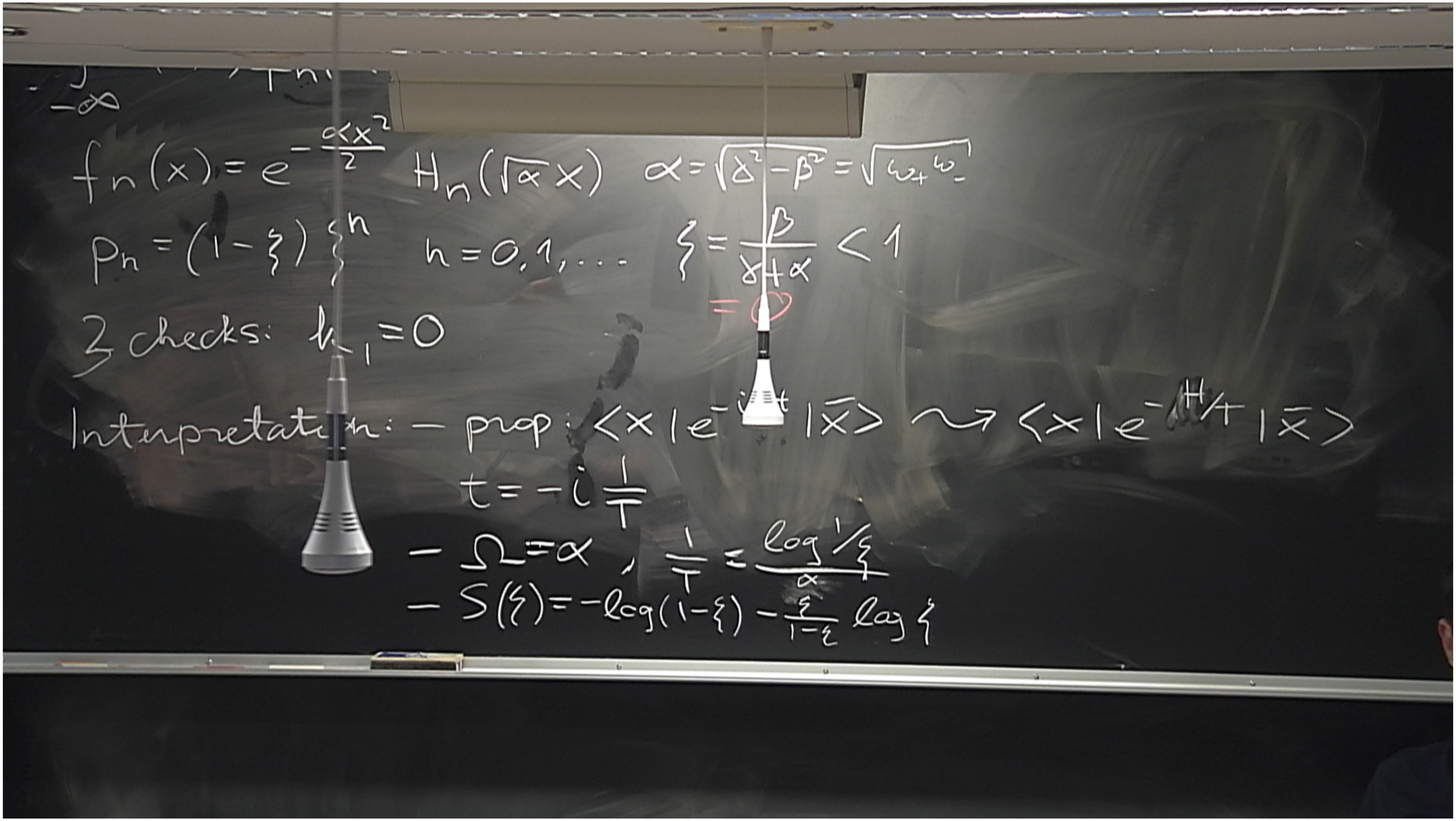
2 checks: [illegible]$_{-1} = 0$

Interpretation: — prop: $\langle x | e^{-iHt} | \bar{x} \rangle$

$$t = -i\,\frac{1}{T}$$



$f_n(x) = e^{-\frac{\alpha x^2}{2}} H_n(\sqrt{\alpha}\, x)$ $\alpha = \sqrt{\gamma^2 - \beta^2} = \sqrt{\omega_+ \omega_-}$
$p_n = (1-\xi)\xi^n$ $n = 0, 1, \dots$ $\xi = \frac{\beta}{\gamma + \alpha} < 1$
$= 0$
3 checks: $h_{-1} = 0$
Interpretation: – prop: $\langle x | e^{-iHt} | \bar{x} \rangle \rightsquigarrow \langle x | e^{-H/T} | \bar{x} \rangle$
$t = -i \frac{1}{T}$
– $\Omega = \alpha$, $\frac{1}{T} = \frac{\log 1/\xi}{\alpha}$
– $S(\xi) = -\log(1-\xi) - \frac{\xi}{1-\xi} \log \xi$

$$\int_{-\infty}^{+\infty} d\bar{x}\, S(x,\bar{x})\, f_n(\bar{x}) = p_n f_n(x)$$

$$f_n(x) = e^{-\frac{\alpha x^2}{2}} H_n(\sqrt{\alpha}\, x) \qquad \alpha = \sqrt{\gamma^2-\beta^2} = \sqrt{\omega_+\omega_-}$$

$$p_n = (1-\xi)\,\xi^n \qquad n = 0, 1, \dots \qquad \xi = \frac{\beta}{\gamma+\alpha} < 1 \qquad \xi\left(\frac{k_1}{k_0}\right)$$

$$= 0$$

2 checks: $k_1 = 0$

Interpretation: – prop: $\langle x | e^{-iHt} | \bar{x} \rangle \rightsquigarrow \langle x | e^{-H/T} | \bar{x} \rangle (\Omega, T$

$$t = -i\,\frac{1}{T}$$

$$\frac{e^{-E_n/T}}{Z}$$

– $\Omega = \alpha$, $\frac{1}{T} = \frac{\log 1/\xi}{\alpha}$

– $S(\xi) = -\log(1-\xi) - \frac{\xi}{1-\xi}\log\xi$

$$-S(\xi) = -\log(1-\xi) - \frac{\xi}{1-\xi}\log\xi$$

N harm osc.: $H = \int d^{d-1}x \left[\frac{1}{2}\pi^2 + \frac{1}{2}(\nabla\phi)^2 + \frac{m^2}{2}\phi^2 \right]$

$$H = \frac{1}{2}\sum_{i=1}^{N} \underset{\pi_i}{\underset{\uparrow}{p_i^2}} + \frac{1}{2}\sum_{i,j} \underset{\phi_i}{\underset{\uparrow}{x_i}} K_{ij} x_j \,, \quad \psi_0(x_1 \dots x_N) \propto \exp\left[-\frac{1}{2} x \underset{\sqrt{K}}{\underset{\parallel}{\Omega}} x \right]$$

$$X_{ij} = \langle 0 | x_i x_j | 0 \rangle = (\Omega^{-1})_{ij} = (D - BA^{-1}B')_{ij}$$

$(\det G)\, S_{out}(Gx, G\bar{x})$ has same eigenv. as $S_{out}(x, \bar{x})$

$$x \equiv \gamma^{-1/2}\, y$$

$$S_{out}(y, \bar{y}) \propto \exp\left[-\frac{1}{2}(y^2 + \bar{y}^2) + y \beta' \bar{y}\right] \qquad \beta' \equiv \gamma^{-1/2}\, \beta\, \gamma^{-1/2}$$

$$\beta' = O^T \beta'_{Diag}\, O \quad , \quad y \equiv O z$$

$$S_{out}(z, \bar{z}) \propto \prod_{i=n+1}^{N} \exp\left[-\frac{1}{2}(z_i^2 + \bar{z}_i^2) + \beta'_i z_i \bar{z}_i\right]$$

S

$\Pi_i \qquad \varphi_i$

Inside: $i = 1 \ldots n$, out: $i = n+1 \ldots N$

$V \qquad \bar{V}$

Ent surf: ∂V

$$\Omega = \begin{array}{cc|c} & \overset{\longleftrightarrow}{n} & \overset{\longleftrightarrow}{N-n} \\ \hline n & A & B \\ N-n & C & D \end{array} \equiv \sqrt{K}$$

$$\int_{-\infty}^{+\infty} d\bar{x}\, \rho(x,\bar{x})\, f_n(\bar{x}) = p_n f_n(x)$$

$$f_n(x) = e^{-\frac{\alpha x^2}{2}} H_n(\sqrt{\alpha}\, x) \qquad \alpha = \sqrt{\gamma^2 - \beta^2} = \sqrt{\omega_+ \omega_-}$$

$$p_n = (1-\xi)\,\xi^n \qquad n = 0, 1, \ldots \qquad \xi = \frac{\beta}{\gamma + \alpha} < 1 \qquad \xi\left(\frac{k_1}{k_0}\right)$$

$= 0$

3 checks: $k_1 = 0$

$$S_{out}(y,\bar{y}) \propto \exp\left[-\frac{1}{2}(y^2 \ldots\right.$$

$$\beta' = O^T \beta'_{Diag} O \,, \quad y \equiv O z$$

$$S_{out}(z,\bar{z}) \propto \prod_{i=n+1}^{N} \exp\left[-\frac{1}{2}(z_i^2+\bar{z}_i^2)+\beta'_i z_i \bar{z}_i\right]$$

$$S = \sum_i S(\xi_i) \qquad \xi_i = \frac{\beta'_i}{1+\sqrt{1-\beta_i'^2}} \quad \checkmark$$

$$\propto \frac{\text{Area}(\partial V)}{a^{d-2}}$$