$$ {}^{z}\mathfrak{e}^{-\nu/2}_{\bar z}\; {}^{z}\overbrace{\zeta}^{\alpha} I \;=\; {}^{\zeta|\bar\zeta|z}_{\nu(1-\alpha)/2}\boxed{\mathfrak{e}}_{\bar\zeta|\zeta|z} \begin{array}{c|c|c} 1-\alpha & -1 & \alpha \\ \hline -1 & 0 & 1 \\ \hline \alpha & 1 & -(1+\alpha) \end{array} $$

$$ M = A + 2B + D + (1-\gamma)/2 $$

$$ {}^{z}\mathfrak{e}^{-\nu/2}_{\bar z} \int_{d\xi}^{\mathbb{R}_d} {}^{z}\overbrace{\xi}^{\gamma}\; {}^{\zeta|\bar\zeta|\xi}_{\nu}\boxed{\mathfrak{e}}_{\bar\zeta|\zeta|\xi} \begin{array}{c|c|c} -A & -B & A+B \\ \hline -B & -D & B+D \\ \hline A+B & B+D & -A-2B-D \end{array} $$

$$ = \left(\frac{\pi}{\nu M}\right)^{d/2} {}^{\zeta|\bar\zeta|z}_{\nu/M}\boxed{\mathfrak{e}}_{\bar\zeta|\zeta|z} \begin{array}{c|c|c} B^2 - AD - A(1-\gamma)/2 & AD - B^2 - B(1-\gamma)/2 & (A+B)(1-\gamma)/2 \\ \hline DA - B^2 - B(1-\gamma)/2 & B^2 - DA - D(1-\gamma)/2 & (B+D)(1-\gamma)/2 \\ \hline (A+B)(1-\gamma)/2 & (B+D)(1-\gamma)/2 & (A+2B+D)(\gamma-1)/2 \end{array} $$

$$ {}^{z}\overbrace{\xi}^{\gamma} = \exp\nu\left(\frac{\gamma}{2} z\overset{t}{z} + (1-\gamma)\, z\overset{t}{\xi} + \frac{\gamma-1}{2}\xi\overset{t}{\xi}\right) = {}^{z|\xi}_{\nu/2}\boxed{\mathfrak{e}}_{\bar z|\xi} \begin{array}{c|c} \gamma & 1-\gamma \\ \hline 1-\gamma & \gamma-1 \end{array} $$

$$ \Longrightarrow \text{LHS} = {}^{z}\mathfrak{e}^{-\nu/2}_{\bar z} \int_{d\xi}^{\mathbb{R}_d} {}^{z|\xi}_{\nu/2}\boxed{\mathfrak{e}}_{\bar z|\xi} \begin{array}{c|c} \gamma & 1-\gamma \\ \hline 1-\gamma & \gamma-1 \end{array}\; {}^{\zeta|\bar\zeta|\xi}_{\nu}\boxed{\mathfrak{e}}_{\bar\zeta|\zeta|\xi} \begin{array}{c|c|c} -A & -B & A+B \\ \hline -B & -D & B+D \\ \hline A+B & B+D & -A-2B-D \end{array} $$

$$ = {}^{z}_{\nu/2}\mathfrak{e}^{\gamma-1}_{\bar z}\; {}^{\zeta|\bar\zeta}_{-\nu}\boxed{\mathfrak{e}}_{\bar\zeta|\zeta} \begin{array}{c|c} A & B \\ \hline B & D \end{array} \int_{d\xi}^{\mathbb{R}_d} {}_{-\nu}{}^{\xi}\mathfrak{e}^{M}_{\xi}\; {}^{\zeta|\bar\zeta|z}_{2\nu}\boxed{\mathfrak{e}}_{\xi} \begin{array}{c} A+B \\ \hline B+D \\ \hline (1-\gamma)/2 \end{array} $$

$$ \overset{\text{real}}{\underset{\text{Gauss}}{=}} {}^{z}_{\nu/2}\boxed{\mathfrak{e}}^{\gamma-1}_{\bar z}\; {}^{\zeta|\bar\zeta}_{-\nu}\boxed{\mathfrak{e}}_{\bar\zeta|\zeta} \begin{array}{c|c} A & B \\ \hline B & D \end{array} \left(\frac{\pi}{\nu M}\right)^{d/2} {}^{\zeta|\bar\zeta|z}_{\nu/M}\boxed{\mathfrak{e}}_{\bar\zeta|\zeta|z} \begin{array}{c} A+B \\ \hline B+D \\ \hline (1-\gamma)/2 \end{array} \; A+B \mid B+D \mid (1-\gamma)/2 $$

$$ = \left(\frac{\pi}{\nu M}\right)^{d/2} {}^{\zeta|\bar\zeta|z}_{\nu/M}\boxed{\mathfrak{e}}_{\bar\zeta|\zeta|z} \begin{array}{c|c|c} (A+B)^2 - AM & (A+B)(B+D) - BM & (A+B)(1-\gamma)/2 \\ \hline (B+D)(A+B) - BM & (B+D)^2 - DM & (B+D)(1-\gamma)/2 \\ \hline (A+B)(1-\gamma)/2 & (B+D)(1-\gamma)/2 & (1-\gamma)^2/4 + M(\gamma-1)/2 \end{array} = \text{RHS} $$

$$\overset{\alpha}{\ulcorner\zeta}\, I = \left(\frac{\nu(1-\gamma)^2}{2\pi\left(\alpha^2-\gamma\right)}\right)^{d/2} \int_{d\xi}^{\mathbb{R}_d} \overset{\gamma}{\ulcorner\xi}\; {}^{\zeta|\bar{\zeta}|\xi}_{\nu}\boxed{\mathfrak{e}}^{\begin{array}{c|c|c} -A & -B & A+B \\ \hline -B & -D & B+D \\ \hline A+B & B+D & -A-2B-D \end{array}}_{\bar{\zeta}|\zeta|\xi}$$

$$2\left(\alpha^2-\gamma\right)A = (1-\alpha)^2\gamma: \quad 2\left(\alpha^2-\gamma\right)B = (1-\alpha)(\alpha-\gamma): \quad 2\left(\alpha^2-\gamma\right)D = (1-\alpha)^2$$

$$2\left(\alpha^2-\gamma\right)(A+2B+D) = (1-\alpha)(1+\alpha)(1-\gamma): \quad 4\left(\alpha^2-\gamma\right)\left(AD-B^2\right) = (1-\alpha)^2(\gamma-1)$$

$$2\left(\alpha^2-\gamma\right)M = 2\left(\alpha^2-\gamma\right)\left(A+2B+D+\frac{1-\gamma}{2}\right) = (1-\gamma)^2$$

$$4\left(\alpha^2-\gamma\right)\frac{B^2-AD-A\frac{1-\gamma}{2} \;\Big|\; AD-B^2-B\frac{1-\gamma}{2}}{DA-B^2-B\frac{1-\gamma}{2} \;\Big|\; B^2-DA-D\frac{1-\gamma}{2}} = \underbrace{(1-\alpha)(1-\gamma)^2}_{=2\left(\alpha^2-\gamma\right)M(1-\alpha)} \begin{array}{c|c} 1-\alpha & -1 \\ \hline -1 & 0 \end{array}$$

$$\Rightarrow \frac{1-\alpha}{2}\begin{array}{c|c|c} 1-\alpha & -1 & \alpha \\ \hline -1 & 0 & 1 \\ \hline \alpha & 1 & -(1+\alpha) \end{array} = \frac{1}{M}\begin{array}{c|c|c} B^2-AD-A\frac{1-\gamma}{2} & AD-B^2-B\frac{1-\gamma}{2} & (A+B)\frac{1-\gamma}{2} \\ \hline DA-B^2-B\frac{1-\gamma}{2} & B^2-DA-D\frac{1-\gamma}{2} & (B+D)\frac{1-\gamma}{2} \\ \hline (A+B)\frac{1-\gamma}{2} & (B+D)\frac{1-\gamma}{2} & (A+2B+D)(\gamma-1)/2 \end{array}$$

$$\left(\frac{\nu M}{\pi}\right)^{d/2} = \left(\frac{\nu(1-\gamma)^2}{2\pi\left(\alpha^2-\gamma\right)}\right)^{d/2} \Rightarrow {}^{z}\mathrm{LHS} = {}^{z}\mathrm{RHS}$$

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$$\int_{d\zeta}^{\mathbb{R}^d} \alpha w + \bar{w} - (\alpha+1)\,\zeta/2\,\boxed{\mathfrak{e}}_{\zeta}^{\nu\,(1-\alpha)\,(1-\gamma)\,/\,\left(\alpha^2-\gamma\right)}\ {}^{z}\lrcorner\zeta^{\gamma} = {}^{z}\boxed{\mathfrak{e}}_{\bar{z}}^{\nu\gamma/2} \int_{d\zeta}^{\mathbb{R}^d} \zeta\,\boxed{\mathfrak{e}}_{\zeta}^{-\nu\,(1-\gamma)\,/2}\ z\,\boxed{\mathfrak{e}}_{\zeta}^{\nu\,(1-\gamma)}\ \alpha w + \bar{w} - (\alpha+1)\,\zeta/2\,\boxed{\mathfrak{e}}_{\zeta}^{\nu\,(1-\alpha)\,(1-\gamma)\,/\,\left(\alpha^2-\gamma\right)}$$

$$= {}^{z}\boxed{\mathfrak{e}}_{\bar{z}}^{\nu\gamma/2} \int_{d\zeta}^{\mathbb{R}^d} \zeta\,\boxed{\mathfrak{e}}_{\zeta}^{-\nu(1-\gamma)^2/2\,\left(\alpha^2-\gamma\right)}\ \alpha w + \bar{w} + \left(\alpha^2-\gamma\right) z/\,(1-\alpha)\,\boxed{\mathfrak{e}}_{\zeta}^{\nu\,(1-\alpha)\,(1-\gamma)\,/\,\left(\alpha^2-\gamma\right)}$$

$$= {}^{z}\boxed{\mathfrak{e}}_{\bar{z}}^{\nu\gamma/2}\ \alpha w + \bar{w} + \left(\alpha^2-\gamma\right) z/\,(1-\alpha)\,\boxed{\mathfrak{e}}_{\bar{\alpha}\bar{w} + w + \left(\bar{\alpha}^2-\bar{\gamma}\right)\bar{z}/\left(1-\bar{\alpha}\right)}^{\nu(1-\alpha)^2/2\,\left(\alpha^2-\gamma\right)}$$

$$= \overbrace{w\,\boxed{\mathfrak{e}}_{\bar{w}}^{(1-\alpha)\,\gamma/2}w\,\boxed{\mathfrak{e}}_{w}^{\alpha-\gamma\bar{w}}\boxed{\mathfrak{e}}_{w}^{1-\alpha/2}}^{-\nu\,(1-\alpha)\,/\,\left(\alpha^2-\gamma\right)}\ w\,\boxed{\mathfrak{e}}_{w}^{-\nu\,(1-\alpha)}\ z\,\boxed{\mathfrak{e}}_{w}^{\nu\,(1-\alpha)}\ \alpha z + (1-\alpha)\,w\,\boxed{\mathfrak{e}}_{\bar{\alpha}\bar{z} + \left(1-\bar{\alpha}\right)\bar{w}}^{\nu/2} = \overbrace{w\,\boxed{\mathfrak{e}}_{\bar{w}}^{(1-\alpha)\,\gamma/2}w\,\boxed{\mathfrak{e}}_{w}^{\alpha-\gamma\bar{w}}\boxed{\mathfrak{e}}_{w}^{1-\alpha/2}}^{-\nu\,(1-\alpha)\,/\,\left(\alpha^2-\gamma\right)}\ {}^{z}\overbrace{\lrcorner w^{\alpha} I}$$

$$\Re\frac{\gamma^2}{\alpha^2-2\alpha+\gamma} > 0 \Longrightarrow$$

$$\overbrace{{}^{z}\underset{\nu}{\overset{1\text{-}\alpha}{\llcorner w}}\, I} \ \underset{\text{restriction}}{\overset{\text{Moyal}}{=}}\ \overbrace{\frac{\gamma^2}{\alpha^2-2\alpha+\gamma}}^{d/2} \overbrace{{}^{w}\boxed{\mathfrak{e}}^{\alpha(1-\gamma)/2}_{\bar w}\ {}^{w}\boxed{\mathfrak{e}}^{\gamma-\alpha}_{w}\ {}^{\bar w}\boxed{\mathfrak{e}}^{(1+\alpha)/2}_{w}}^{-\nu\alpha/\left(\alpha^2-2\alpha+\gamma\right)} \int_{d\zeta/(2\pi)^{d/2}}^{\mathbb{R}^d} {}^{(1-\alpha)w+\bar w-(1-\alpha/2)\zeta}\boxed{\mathfrak{e}}^{\nu\alpha\gamma/\left(\alpha^2-2\alpha+\gamma\right)}_{\zeta}\ {}^{z}\underset{\nu}{\overset{1\text{-}\gamma}{\llcorner \zeta}}$$

$$\overbrace{\frac{\gamma^2}{\alpha^2-2\alpha+\gamma}}^{d/2} \int_{d\zeta/(2\pi)^{d/2}}^{\mathbb{R}^d} {}^{(1-\alpha)w+\bar w-(1-\alpha/2)\zeta}\boxed{\mathfrak{e}}^{\nu\alpha\gamma}_{\zeta}\ {}^{z}\underset{\nu\left(\alpha^2-2\alpha+\gamma\right)}{\overset{1\text{-}\gamma}{\llcorner \zeta}}$$

$$= {}^{z}\boxed{\mathfrak{e}}^{\nu\left(\alpha^2-2\alpha+\gamma\right)(1-\gamma)/2}_{\bar z} \overbrace{\frac{\gamma^2}{\alpha^2-2\alpha+\gamma}}^{d/2} \int_{d\zeta/(2\pi)^{d/2}}^{\mathbb{R}^d} {}^{\zeta}\boxed{\mathfrak{e}}^{-\nu\left(\alpha^2-2\alpha+\gamma\right)\gamma/2}_{\zeta}\ {}^{z}\boxed{\mathfrak{e}}^{\nu\left(\alpha^2-2\alpha+\gamma\right)\gamma}_{\zeta}\ {}^{(1-\alpha)w+\bar w-(1-\alpha/2)\zeta}\boxed{\mathfrak{e}}^{\nu\alpha\gamma}_{\zeta}$$

$$= {}^{z}\boxed{\mathfrak{e}}^{\nu\left(\alpha^2-2\alpha+\gamma\right)(1-\gamma)/2}_{\bar z} \overbrace{\frac{\gamma^2}{\alpha^2-2\alpha+\gamma}}^{d/2} \int_{d\zeta/(2\pi)^{d/2}}^{\mathbb{R}^d} {}^{\zeta}\boxed{\mathfrak{e}}^{-\nu\gamma^2/2}_{\zeta}\ {}^{(1-\alpha)w+\bar w+(\alpha-2+\gamma/\alpha)z}\boxed{\mathfrak{e}}^{\nu\alpha\gamma}_{\zeta}$$

$$= {}^{z}\boxed{\mathfrak{e}}^{\nu\left(\alpha^2-2\alpha+\gamma\right)(1-\gamma)/2}_{\bar z}\ {}^{(1-\alpha)w+\bar w+(\alpha-2+\gamma/\alpha)z}\boxed{\mathfrak{e}}^{\nu\alpha^2/2}_{\left(1-\bar\alpha\right)\bar w+w+\underbrace{\bar\alpha-2+\bar\gamma/\bar\alpha}\bar z}$$

$$= \overbrace{{}^{w}\boxed{\mathfrak{e}}^{\alpha(1-\gamma)/2}_{\bar w}\ {}^{w}\boxed{\mathfrak{e}}^{\gamma-\alpha}_{w}\ {}^{\bar w}\boxed{\mathfrak{e}}^{(1+\alpha)/2}_{w}}^{\nu\alpha}\ {}^{w}\boxed{\mathfrak{e}}^{-\nu\left(\alpha^2-2\alpha+\gamma\right)\alpha}_{w}\ {}^{z}\boxed{\mathfrak{e}}^{\nu\left(\alpha^2-2\alpha+\gamma\right)\alpha}_{w}\ {}^{(1-\alpha)z+\alpha w}\boxed{\mathfrak{e}}^{\nu\left(\alpha^2-2\alpha+\gamma\right)/2}_{\left(1-\bar\alpha\right)\bar z+\bar\alpha\bar w}$$

$$= \overbrace{{}^{w}\boxed{\mathfrak{e}}^{\alpha(1-\gamma)/2}_{\bar w}\ {}^{w}\boxed{\mathfrak{e}}^{\gamma-\alpha}_{w}\ {}^{\bar w}\boxed{\mathfrak{e}}^{(1+\alpha)/2}_{w}}^{\nu\alpha}\ \overbrace{{}^{z}\underset{\nu\left(\alpha^2-2\alpha+\gamma\right)}{\overset{1\text{-}\alpha}{\llcorner w}}\, I}$$