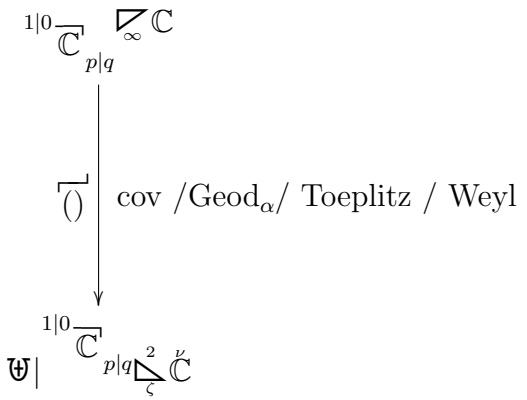

$$I \subset K \Rightarrow \prod_i^I \zeta_i \, \bar{\omega}_i \, \overset{*}{\omega}_{K \llcorner I} \, \omega_K = \frac{K \llcorner I}{I} \, \overset{*}{\omega}_K \, \omega_K \, \zeta_I$$

$$\text{LHS} = \frac{K \llcorner I}{I} \prod_i^I \zeta_i \, \bar{\omega}_i \, \overset{*}{\omega}_{K \llcorner I} \, \omega_{K \llcorner I} \, \omega_I = \frac{K \llcorner I}{I} \, \overset{*}{\omega}_{K \llcorner I} \, \omega_{K \llcorner I} \prod_i^I \zeta_i \, \bar{\omega}_i \, \omega_I = \frac{K \llcorner I}{I} \, \overset{*}{\omega}_{K \llcorner I} \, \omega_{K \llcorner I} \, \omega_I^* \, \omega_I \, \zeta_I = \text{RHS}$$

$$\overbrace{\sum_{MN}\mathsf{J}^{N}_{M}{}^{*}\zeta_{M}\zeta_{N}}^{\nu} = \begin{array}{|c|c|c|}\hline \approx & + & \approx \\ \hline \cdots & \overbrace{\sum_{MN}\mathsf{J}^{N}_{M}{}^{*}\zeta_{M}\zeta_{N}}^{I\ \ \nu\ \ J} & \cdots \\ \hline \approx & + & \approx \\ \hline \end{array}$$

$$\overbrace{\sum_{MN}\mathsf{J}^{N}_{M}{}^{*}\zeta_{M}\zeta_{N}}^{I\ \ \nu\ \ J} = \sum_{K}^{\supset I\cup J}\frac{K\llcorner I}{I}\frac{K\llcorner J}{J}\frac{\Gamma_{\nu+|I|-p}}{\Gamma_{\nu+|K|-p}}\overbrace{\underbrace{1-z\overset{*}{z}}_{|K|-|I|}\mathsf{J}^{K\llcorner J}_{K\llcorner I}}^{\nu+|I|\ \ \nu+|J|}$$

$$I\cup J\subset K\Longrightarrow\int_{d\omega}^{|0\rangle\mathbb{C}_{|q}}\overset{*}{\omega}_{Q\llcorner K}\,\omega_{Q\llcorner K}\prod_{i}^{I}\zeta_{i}\,\bar{\omega}_{i}\,\overset{*}{\omega}_{K\llcorner I}\,\omega_{K\llcorner J}\,\omega_{J}=\frac{K\llcorner J}{J}\int_{d\omega}^{|0\rangle\mathbb{C}_{|q}}\overset{*}{\omega}_{Q\llcorner K}\,\omega_{Q\llcorner K}\prod_{i}^{I}\zeta_{i}\,\bar{\omega}_{i}\,\overset{*}{\omega}_{K\llcorner I}\,\omega_{K}$$

$$=\frac{K\llcorner I}{I}\frac{K\llcorner J}{J}\int_{d\omega}^{|0\rangle\mathbb{C}_{|q}}\overset{*}{\omega}_{Q\llcorner K}\,\omega_{Q\llcorner K}\,\overset{*}{\omega}_{K}\,\omega_{K}\,\zeta_{I}=\frac{K\llcorner I}{I}\frac{K\llcorner J}{J}\int_{d\omega}^{|0\rangle\mathbb{C}_{|q}}\overset{*}{\omega}_{Q}\,\omega_{Q}\,\zeta_{I}=\frac{K\llcorner I}{I}\frac{K\llcorner J}{J}\,\zeta_{I}$$

$$\Longrightarrow\quad\overbrace{\overbrace{\sum_{MN}\mathsf{J}^{N}_{M}\overset{*}{\omega}_{M}\omega_{N}}^{\nu}\sum_{J}\mathsf{\Upsilon}^{J}\,\omega_{J}}^{z|\zeta}=\int_{dw/\,\pi^{p}}^{\overbrace{|1\rangle\mathbb{C}_{p}}}\int_{d\omega}^{|0\rangle\mathbb{C}_{|q}}\frac{\overbrace{1-w\overset{*}{w}-\omega\overset{*}{\omega}}^{\nu+q-p-1}}{\Gamma_{\nu+q-p}}\frac{\Gamma_{\nu}}{\underbrace{1-z\overset{*}{w}-\zeta\overset{*}{\omega}}_{\nu}}\sum_{MN}{}_{w}\mathsf{J}^{N}_{M}\,\overset{*}{\omega}_{M}\,\omega_{N}\sum_{J}{}^{w}\mathsf{\Upsilon}^{J}\,\omega_{J}$$

$$=\int_{dw/\,\pi^{p}}^{\overbrace{|1\rangle\mathbb{C}_{p}}}\int_{d\omega}^{|0\rangle\mathbb{C}_{|q}}\sum_{K}\frac{\overbrace{1-w\overset{*}{w}}^{\nu+|K|-p-1}}{\Gamma_{\nu+|K|-p}}\overset{*}{\omega}_{Q\llcorner K}\,\omega_{Q\llcorner K}\sum_{I}\frac{\Gamma_{\nu+|I|}}{\underbrace{1-z\overset{*}{w}}_{\nu+|I|}}\prod_{i}^{I}\zeta_{i}\,\bar{\omega}_{i}\sum_{MN}{}_{w}\mathsf{J}^{N}_{M}\,\overset{*}{\omega}_{M}\,\omega_{N}\sum_{J}{}^{w}\mathsf{\Upsilon}^{J}\,\omega_{J}$$

$$\underset{K=I\dot{\cup}M}{\overset{K=J\dot{\cup}N}{=}}\sum_{K}^{\supset I\cup J}\int_{dw/\,\pi^{p}}^{\overbrace{|1\rangle\mathbb{C}_{p}}}\frac{\overbrace{1-w\overset{*}{w}}^{\nu+|K|-p-1}}{\Gamma_{\nu+|K|-p}}\frac{\Gamma_{\nu+|I|}}{\underbrace{1-z\overset{*}{w}}_{\nu+|I|}}{}_{w}\mathsf{J}^{K\llcorner J}_{K\llcorner I}\,{}^{w}\mathsf{\Upsilon}^{J}\int_{d\omega}^{|0\rangle\mathbb{C}_{|q}}\overset{*}{\omega}_{Q\llcorner K}\,\omega_{Q\llcorner K}\prod_{i}^{I}\zeta_{i}\,\bar{\omega}_{i}\,\overset{*}{\omega}_{K\llcorner I}\,\omega_{K\llcorner J}\,\omega_{J}$$

$$=\sum_{K}^{\supset I\cup J}\frac{K\llcorner I}{I}\frac{K\llcorner J}{J}\,\zeta_{I}\int_{dw/\,\pi^{p}}^{\overbrace{|1\rangle\mathbb{C}_{p}}}\frac{\overbrace{1-w\overset{*}{w}}^{\nu+|K|-p-1}}{\Gamma_{\nu+|K|-p}}\frac{\Gamma_{\nu+|I|}}{\underbrace{1-z\overset{*}{w}}_{\nu+|I|}}{}_{w}\mathsf{J}^{K\llcorner J}_{K\llcorner I}\,{}^{w}\mathsf{\Upsilon}^{J}$$

$$=\sum_{K}^{\supset I\cup J}\frac{K\llcorner I}{I}\frac{K\llcorner J}{J}\frac{\Gamma_{\nu+|I|-p}}{\Gamma_{\nu+|K|-p}}\,\zeta_{I}\boxed{\int_{dw/\,\pi^{p}}^{\overbrace{|1\rangle\mathbb{C}_{p}}}\frac{\overbrace{1-w\overset{*}{w}}^{\nu+|I|-p-1}}{\Gamma_{\nu+|I|-p}}\frac{\Gamma_{\nu+|I|}}{\underbrace{1-z\overset{*}{w}}_{\nu+|I|}}{}_{w}\mathsf{J}^{K\llcorner J}_{K\llcorner I}\underbrace{1-w\overset{*}{w}}_{|K|-|I|}\,{}^{w}\mathsf{\Upsilon}^{J}}$$

$$\square=\P\underbrace{1-w\overset{*}{w}}_{|K|-|I|}\,\mathsf{J}^{K\llcorner J}_{K\llcorner I}\,\mathsf{\Upsilon}^{J}\,7^{\nu+|I|}z=\overbrace{\underbrace{1-w\overset{*}{w}}_{|K|-|I|}\mathsf{J}^{K\llcorner J}_{K\llcorner I}\quad\mathsf{\Upsilon}^{J}}^{z\ \ \overbrace{\nu+|I|\ \ \ \ \ \ \ \ \nu+|J|}}$$

$$\P\,\mathsf{J}^{N}_{M}\,\overset{*}{\omega}_{M}\,\omega_{N}\,7(z\overset{\nu}{|}\zeta)\,=\sum_{I}^{\subset N}\frac{N\llcorner I}{I}\,\frac{\Gamma_{\nu+|I|-p}}{\Gamma_{\nu+|N|-p}}\P\,\overbrace{1-w\overset{*}{w}}^{|N|-|I|}\,\mathsf{J}^{N}_{N\llcorner I}\,7^{\nu+|I|}\,\zeta_{I}$$