$${}^{z}\Delta_{e}\,{}^{z}\Phi_{\lambda} = \sum^{m} \xi_{m:\nu}(\lambda)\, p_{m}(z)$$

$$\mathfrak{b}_{\nu}(\lambda)^{-1} = \sum^{m} \xi_{m:\nu}(\lambda)\left(\mathcal{B}_{\nu}^{-1} p_{m}\right)(0) = \sum^{m} \xi_{m:\nu}(\lambda)\, \sharp_{m}(0)$$

$$\sharp_{m}(0) = \int \mathfrak{b}_{\nu}(\lambda)^{-1}\, \xi_{m:\nu}(\lambda)\, \lambda \tanh(\pi\lambda)\, \Gamma_{\pm\lambda i - 1/2}$$

$$\xi_{m:\nu}(\lambda) = \frac{(\nu)_{m}}{m!}\begin{bmatrix}-m{:}\pm\lambda i + 1/2\\ \nu{:}1\end{bmatrix}(1) = \frac{(\nu)_{m}}{m!}\sum_{0\leqslant j\leqslant m}\frac{(-m)_{j}(\pm\lambda i + 1/2)_{j}}{(\nu)_{j}(j!)^{2}}$$

$$\xi_{m+1:0}(\lambda) = -\left(\frac{1}{4}+\lambda^{2}\right)\begin{bmatrix}-m{:}\frac{3}{2}\pm\lambda i\\ 2{:}2\end{bmatrix}(1)$$

$${}^{z}\underline{\begin{bmatrix}a_{1}{:}\cdots{:}a_{p}\\ b_{1}{:}\cdots{:}b_{q}\end{bmatrix}}_{m} = \frac{(a_{1})_{m}\cdots(a_{p})_{m}}{(b_{1})_{m}\cdots(b_{q})_{m}}\,{}^{z}\begin{bmatrix}a_{1}+m{:}\cdots{:}a_{p}+m\\ b_{1}+m{:}\cdots{:}b_{q}+m\end{bmatrix}$$

$$S_{m}\left(\lambda^{2}{:}a{:}b{:}c\right) = (a+b)_{m}(a+c)_{m}\,{}^{1}\begin{bmatrix}-m{:}a\pm\lambda i\\ a+b{:}a+c\end{bmatrix}$$

$$S_{m}\left(\lambda^{2}{:}\frac{1}{2}{:}\nu-\frac{1}{2}{:}\frac{1}{2}\right) = (\nu)_{m}\, m!\,{}^{1}\begin{bmatrix}-m{:}\pm\lambda i + 1/2\\ \nu{:}1\end{bmatrix} = (m!)^{2}\,\xi_{m:\nu}(\lambda)$$

$$\int_{d\lambda} S_{m}\left(\lambda^{2}\right) S_{n}\left(\lambda^{2}\right)\overline{\frac{\Gamma_{a+\lambda i}\Gamma_{b+\lambda i}\Gamma_{c+\lambda i}}{\Gamma_{2\lambda i}}}^{2}$$

$$\overline{\frac{\Gamma_{\lambda i + 1/2}\Gamma_{-\lambda i + 1/2}}{\Gamma_{2\lambda i}}}^{2} = 4\pi\lambda\tanh(\pi\lambda)$$

$$S_{m}\left(\lambda^{2}{:}\frac{3}{2}{:}\frac{1}{2}{:}\frac{1}{2}\right) = (m+1!)^{2}\,{}^{1}\begin{bmatrix}-m{:}\pm\lambda i + 3/2\\ 2{:}2\end{bmatrix} = (m+1!)^{2}\frac{\xi_{m+1:0}}{\lambda^{2}+1/4}$$

$$\int_{d\lambda}\overline{\frac{\Gamma_{\lambda i + 3/2}\Gamma_{\lambda i + 1/2}\Gamma_{\lambda i + 1/2}}{\Gamma_{2\lambda i}}}^{2}$$

$$\int_{d\lambda} \xi_{m:0}(\lambda)\, \xi_{n:0}(\lambda)\, \lambda \tanh(\pi\lambda)\, \Gamma_{\pm\lambda i-\ 1/2} = \frac{\delta_{m:n}}{m^2}$$

$$\int_{d\lambda} \xi_{m:0}(\lambda)\, \lambda \tanh(\pi\lambda)\, \Gamma_{\pm\lambda i-\ 1/2}$$