

$$\mathbb{h} \begin{array}{c} \mathbb{N} \\ \triangleleft \\ \mathbb{K} \end{array} \xleftarrow{\mathbb{L}'} 2^n \mathbb{K}$$

$$\mathbb{h} \begin{array}{c} \mathbb{N} \\ \triangleleft \\ \mathbb{K} \end{array} \ni \mathbb{L}^J = \sum_{j \in J} \mathbb{L}^j \quad \text{dual standard basis}$$

$$\mathbb{L}^I \times \mathbb{L}^J = \mathbb{L}^I \hat{\eta} \mathbb{L}^J = \det \mathbb{L}^i \times \mathbb{L}^j = \det {}_i \eta^j = {}_I \eta^J = {}_I \hat{\eta}^J$$

$$\times {}_I \mathbb{L} = \mathbb{L}^I {}_I \eta^I$$

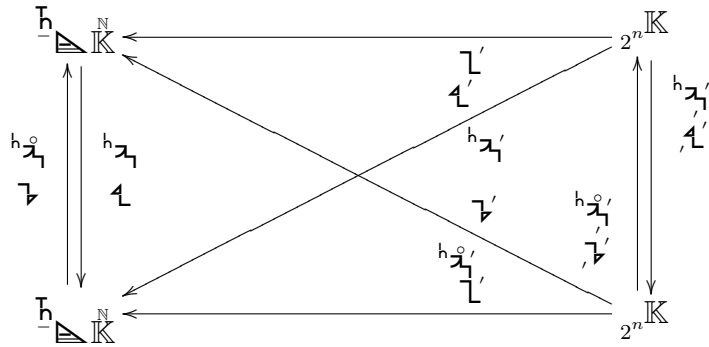
$$\mathbb{L}^I = (\times {}_I \mathbb{L}) {}_I \eta^I$$

$$\ast \mathbb{L}^I = \mathbb{L}^{N-I} \begin{array}{c} I > N-I \\ (-1) \end{array} {}_I \eta^I$$

$$\mathbb{A} = \mathbb{L} \underbrace{\mathbb{L}'}_{\mathbb{A}}: \quad {}_M \mathbb{L} \mathbb{L}^N = \det ({}_{\mu} \mathbb{L} \mathbb{L}^{\nu}) = \det {}_{\mu} \delta^{\nu} = {}_M \delta^N$$

$$\mathbb{A} = \mathbb{L} \underbrace{\mathbb{L}'}_{\mathbb{A}}: \quad \mathbb{L}^I \mathbb{L}^J = \det \mathbb{L}^i \mathbb{L}^j = \det {}_i \delta^j = {}_I \delta^J = {}_I \mathbb{L} \mathbb{L}^J$$

$$\mathbb{L}^I = {}_I \mathbb{L}$$



$$\mathbb{L}^I \times_{\mathbb{h}} \mathbb{L}^J = \begin{cases} \mathbb{L}^I \mathbb{h} \mathbb{L}^J = \mathbb{h} \mathbb{L}^{IJ} \\ \mathbb{L}^I \mathbb{L}^J_{\mathbb{h}} = {}_I \mathbb{L} \mathbb{L}^J_{\mathbb{h}} = \det \mathbb{L}^i \times_{\mathbb{h}} \mathbb{L}^j = \det {}_I \mathbb{L}^J_{\mathbb{h}} = {}_I \mathbb{L}^J_{\mathbb{h}} \end{cases}$$

$$\tilde{\times} {}_J \mathbb{L} = \sum_{|I|=|J|} \mathbb{L}^I {}_I \tilde{\mathbb{L}}^J$$

$$\mathbb{L}^J = \sum_{|I|=|J|} (\tilde{\times} {}_I \mathbb{L}) {}_I \mathbb{L}^J_z$$

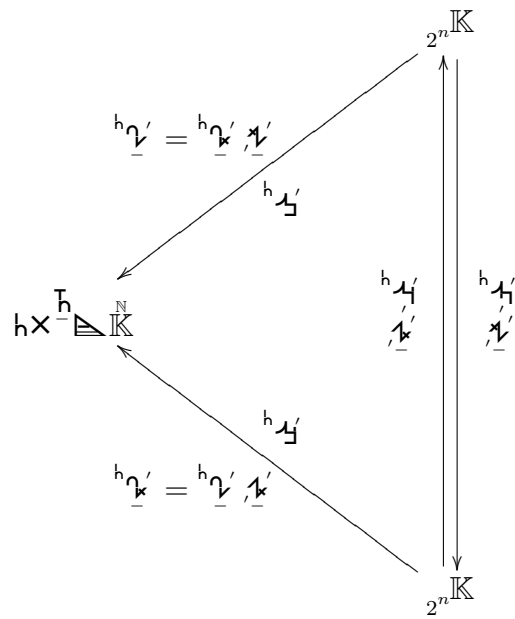
$${}_M \mathbb{L} \sum_I \mathbb{L}^I {}_I \tilde{\mathbb{L}}^J = \sum_I {}_M \delta^I {}_I \tilde{\mathbb{L}}^J = {}_M \tilde{\mathbb{L}}^J = {}_M \mathbb{L} \tilde{\times} {}_J \mathbb{L}$$



$$\begin{cases} \mathcal{A}'_1 = \mathcal{L}' \mathcal{A}'_1 = \mathcal{A}'_1 \mathcal{L}'_1 & \begin{cases} \mathcal{A}'_1^N = \mathcal{L}'^K \mathcal{A}'_1^N = \mathcal{A}'_1 \mathcal{L}'^N \\ \mathcal{B}'_1 = \mathcal{L}' \mathcal{B}'_1 = \mathcal{B}'_1 \mathcal{L}'_1 & \begin{cases} \mathcal{A}'_1^N = \mathcal{L}'^K \mathcal{A}'_1^N = \mathcal{A}'_1 \mathcal{L}'^N \\ \mathcal{B}'_1 = \mathcal{L}' \mathcal{B}'_1 = \mathcal{B}'_1 \mathcal{L}'_1 & \begin{cases} \mathcal{A}'_1^N = \mathcal{L}'^K \mathcal{A}'_1^N = \mathcal{A}'_1 \mathcal{L}'^N \\ \mathcal{B}'_1 = \mathcal{L}' \mathcal{B}'_1 = \mathcal{B}'_1 \mathcal{L}'_1 \end{cases} \end{cases} \end{cases} \end{cases}$$

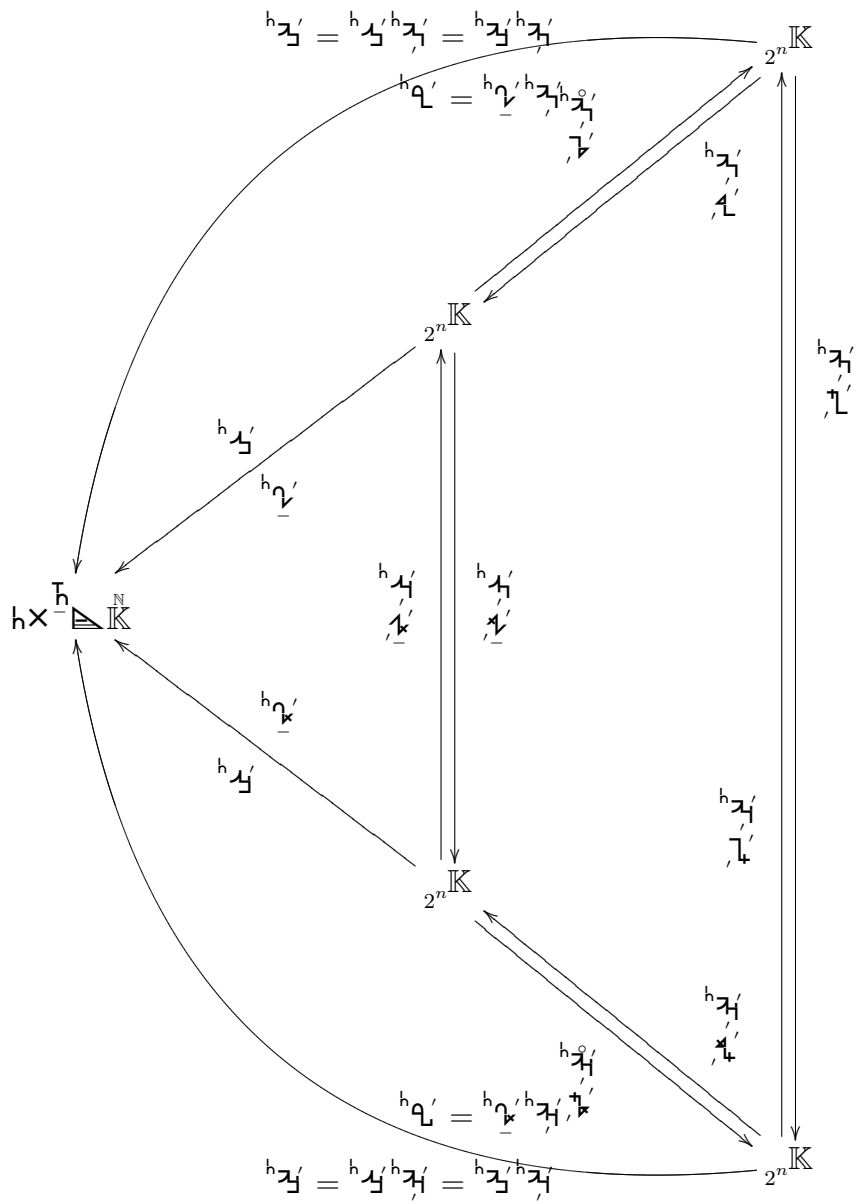
$$\begin{cases} \mathcal{A}'_1 = \mathcal{L}' \mathcal{A}'_1 = \mathcal{A}'_1 \mathcal{L}'_1 & \begin{cases} \mathcal{A}'_1^J = \mathcal{L}'^M \mathcal{A}'_1^J = \mathcal{A}'_1 \mathcal{L}'^J \\ \mathcal{A}'_1 = \mathcal{L}' \mathcal{A}'_1 = \mathcal{A}'_1 \mathcal{L}'_1 & \begin{cases} \mathcal{A}'_1^J = \mathcal{L}'^M \mathcal{A}'_1^J = \mathcal{A}'_1 \mathcal{L}'^J \\ \mathcal{A}'_1 = \mathcal{L}' \mathcal{A}'_1 = \mathcal{A}'_1 \mathcal{L}'_1 \end{cases} \end{cases} \end{cases}$$

$$\begin{cases} \mathcal{A}'_1 = \mathcal{L}' \mathcal{A}'_1 = \mathcal{A}'_1 \mathcal{L}'_1 & \begin{cases} \mathcal{A}'_1^N = \mathcal{L}'^I \mathcal{A}'_1^N = \mathcal{A}'_1 \mathcal{L}'^N \\ \mathcal{B}'_1 = \mathcal{L}' \mathcal{B}'_1 = \mathcal{B}'_1 \mathcal{L}'_1 & \begin{cases} \mathcal{A}'_1^N = \mathcal{L}'^I \mathcal{A}'_1^N = \mathcal{A}'_1 \mathcal{L}'^N \\ \mathcal{B}'_1 = \mathcal{L}' \mathcal{B}'_1 = \mathcal{B}'_1 \mathcal{L}'_1 \end{cases} \end{cases} \end{cases}$$



$h \times \mathbb{K}^N \ni h_{\mathcal{A}'_1}$  holonomic basis

$$\mathcal{A}'_1 = \mathcal{L}'_{h_{\mathcal{A}'_1}} \mathcal{A}'_1: \quad M \delta^N = M_{h_{\mathcal{A}'_1}} \mathcal{A}'_1^N$$



$$h \times h^{-1} \mathbb{K} \ni \begin{cases} h_{j'} \\ h_{j''} = \sum_{j \in J} h_{j''} \end{cases} \text{ dual ONbasis}$$

$$h_{j''} \otimes_h h_{j''} = \eta^j$$

$$\otimes_I \mathbb{K}_h = h_{j''} \eta^I$$

$$h_{j''} = (\otimes_I \mathbb{K}_h)_I \eta^I$$

$$\ast h_{\mathbb{L}}^I = h_{\mathbb{L}}^{N-I} \overline{(-1)}^{I > N-I} \eta^I$$

$$\mathbb{1} = \begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases} : \quad \delta^J = \begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases}$$

$$\begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{Z}'_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases} \begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}_I}} = \overline{h_{\mathbb{L}}^{\mathbb{L}_I} h_{\mathbb{L}}^{\mathbb{Z}_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases}$$

$$\overline{h_{\mathbb{L}}^{\mathbb{Z}'_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} = \begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases} : \quad \overline{h_{\mathbb{L}}^{\mathbb{Z}_I}} = \begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases}$$

$$\begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{Z}'_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases} \begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}_I}} = \overline{h_{\mathbb{L}}^{\mathbb{L}_I} h_{\mathbb{L}}^{\mathbb{Z}_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases}$$

$$\begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}'_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{Z}'_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases} \begin{cases} \overline{h_{\mathbb{L}}^{\mathbb{Z}_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{Z}_I} h_{\mathbb{L}}^{\mathbb{Z}'_I}} \\ \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} = \overline{h_{\mathbb{L}}^{\mathbb{L}'_I} h_{\mathbb{L}}^{\mathbb{L}'_I}} \end{cases}$$

