

$$\text{Sie}_{q_-}[x_-] := \text{Exp} \left[ \sum_{k=1}^{\$TD} \frac{q^{-k(k+1)/2} (1-q)^k}{k(1-q^k)} x^k \right];$$

**\$TD = 3;**

$$\left( \mathcal{O}[U_1[x \rightarrow x], e_q[\hbar \mu x]] // \text{Si}_1 // \text{ExpandAB} \right) - \left( \mathcal{O}[U_1[a \rightarrow a, x \rightarrow x], e_{q^{-1}}[-\hbar \mu e^{\hbar \beta a} x]] // \text{ExpandAB} \right)$$

$$\alpha \beta \mu \hbar^2 U_1[x] - \frac{1}{2} \alpha^2 \beta^2 \mu \hbar^3 U_1[x] + \alpha \beta^2 \mu \hbar^3 U_1[a, x] - 2 \alpha \beta \mu^2 \hbar^3 U_1[x, x]$$

**\$TD = 3;**

$$\left( \mathcal{O}[U_1[x \rightarrow x], e_q[\hbar \mu x]] // \text{Si}_1 // \text{ExpandAB} \right) - \left( \mathcal{O}[U_1[a \rightarrow a, x \rightarrow x], \text{Sie}_q[-\hbar \mu e^{\hbar \beta a} x]] // \text{ExpandAB} \right)$$

$$- \frac{1}{2} \alpha \beta \mu^2 \hbar^3 U_1[x, x]$$