$$N_\mathrm{e}\sum_{i\neq p} C_{ip}N_i = N_\mathrm{e}N_p\sum_{i\neq p} C_{pi} + N_p\sum_{i<p} A_{pi}$$

$$\sigma_{N_p} = \frac{\mathrm{d}N_p}{N_p} = \sigma(N_\mathrm{e}\sum_{i\neq p} C_{ip}N_i) + \sigma(N_\mathrm{e}\sum_{i\neq p} C_{pi} + \sum_{i<p} A_{pi})$$

$$\begin{aligned}\sigma_{N_p} &= \sigma(N_\mathrm{e}\sum_{i\neq p} C_{ip}N_i) + \sigma(N_\mathrm{e}\sum_{i\neq p} C_{pi})\\ &\simeq \frac{\mathrm{d}F_{p,\mathrm{in}}}{F_{p,\mathrm{in}}} + \frac{\mathrm{d}F_{p,\mathrm{out}}}{F_{p,\mathrm{out}}}\end{aligned}$$

$$\sigma_{N_p} \simeq 2\left(\frac{\mathrm{d}F_{p,\mathrm{in}}}{F_{p,\mathrm{in}}}\right) \simeq 2\left(\frac{\mathrm{d}F_{p,\mathrm{out}}}{F_{p,\mathrm{out}}}\right)$$

$$\boxed{\sigma_{N_p} = E_{jp}\sigma(C_{jp}) = 2\left(1-\frac{2}{F_{j,\mathrm{in}}}\right)^{-1}\frac{f_{jp}}{F_{p,\mathrm{in}}}\sigma(C_{jp})}$$

$$\sigma(N_j) \simeq 2\left(\frac{\mathrm{d}F_{j,\mathrm{out}}}{F_{j,\mathrm{out}}}\right) \simeq 2\left(\frac{\mathrm{d}f_{jp}}{F_{j,\mathrm{in}}}\right)$$

$$\begin{aligned}\mathrm{d}F_{p,\mathrm{in}} = \mathrm{d}f_{jp} &= \mathrm{d}(N_\mathrm{e}N_jC_{jp})\\ &= N_\mathrm{e}C_{jp}N_j\frac{\mathrm{d}C_{jp}}{C_{jp}} + N_\mathrm{e}C_{jp}N_j\frac{\mathrm{d}N_j}{N_j}\\ &= f_{jp}\sigma(C_{jp}) + f_{jp}\sigma(N_j)\end{aligned}$$

$$\mathrm{d}f_{jp} = f_{jp}\sigma(C_{jp}) + 2f_{jp}\left(\frac{\mathrm{d}f_{jp}}{F_{j,\mathrm{in}}}\right)$$

$$\mathrm{d}f_{1p} = N_\mathrm{e}C_{1p}\mathrm{d}N_1 \simeq N_\mathrm{e}C_{1p}N_1\frac{\mathrm{d}N_1}{N_1} = f_{1p}\sigma(N_1)$$

$$\boxed{\begin{aligned}\sigma_{N_p} &= 2\frac{f_{1p}}{F_{p,\mathrm{in}}}\sigma(N_1) = 2\frac{f_{1p}}{F_{p,\mathrm{in}}}E_{j1}\sigma(C_{j1})\\ &= E_{j1p}\sigma(C_{j1})\end{aligned}}$$

$$\boxed{\begin{aligned}\sigma_{N_p} &= 2^2\cdot\frac{f_{1p}}{F_{p,\mathrm{in}}}\cdot\frac{f_{\mathrm{He}^+1}}{F_{1,\mathrm{in}}}\cdot E_{\mathrm{He}^{2+}\mathrm{He}^+}\sigma(C_{\mathrm{He}^{2+}\mathrm{He}^+})\\ &= E_{\mathrm{He}^{2+}\mathrm{He}^+1p}\sigma(C_{\mathrm{He}^{2+}\mathrm{He}^+})\end{aligned}}$$