Smith

$$p + q = D - 2 \text{ dual pair}$$

$$\frac{\alpha^2}{2} = 2 - \frac{pq}{p+q}$$

$$\bcancel{P} = \underline{x}^{M_1} \wedge \cdots \wedge \underline{x}^{M_p}{}_{M_1 \cdot\cdot M_p} \bcancel{P}$$

$$\mathcal{L}^{k}_{\bcancel{D}:\bcancel{0}:\bcancel{P}} = \boxed{\bcancel{D}} - \overset{2}{\ulcorner\bcancel{0}\urcorner} - \bcancel{0}^{-\alpha} \overset{2}{\ulcorner\underline{\bcancel{P}}\urcorner} = \sqrt{-g}\left(\boxed{\bcancel{D}} - \frac{1}{2}\overset{2}{\ulcorner\bcancel{0}\urcorner} - \frac{1}{2\,(p+1)!}\overset{2}{\ulcorner\underline{\bcancel{P}}\urcorner}\bcancel{0}^{-\alpha}\right)$$

$${}^{t:x}\cancel{\emptyset} = \left(\cancel{\emptyset}^{M}\right)_{M \in D}$$

$$\mathcal{L}^{\bcancel{D}:\bcancel{0}:\bcancel{P}}_{\cancel{p}:\cancel{\emptyset}} = \frac{1}{2}\sqrt{-\cancel{p}}\left(p - 2 - {}^{\cancel{\emptyset}^{\alpha/p}}\bcancel{0}\,\cancel{p}^{ij}{}_{ij}\,\underbrace{\cancel{\emptyset} \ltimes \bcancel{D}}\right) - \cancel{\emptyset} \ltimes \bcancel{P}$$

$$\mathcal{L}^{p}_{\bcancel{D}\bcancel{0}\bcancel{P}} + \mathcal{L}^{\bcancel{D}\bcancel{0}\bcancel{P}}_{\cancel{p}:\cancel{\emptyset}}$$

$$3: \quad \ddagger: \quad \begin{matrix} p^- \\ q^- \end{matrix} \ni x{:}t{:}\begin{matrix} u \\ v \end{matrix}$$

$$N \text{ coincident } {}^{p-}_{\text{el}}\text{branes}: \quad H^{p+q}_{x:v} = 1 + \frac{N}{\ulcorner x{:}v \urcorner^{q}} = \bcancel{0}^{-2/\alpha}$$

$$\underline{\bcancel{P}} = \underline{H}^{-p-q}_{xv} \wedge \underline{\underline{t{:}u}} \Longrightarrow \bcancel{0}^{-\alpha}\,\overset{*}{\underline{\bcancel{P}}} = \underline{\mathbb{S}}^{q+}_{\llcorner x:v \lrcorner} \Longrightarrow Q_{\text{el}} = \int_{\underline{\mathbb{S}}^{q+}_{\llcorner x:v \lrcorner}}^{\mathbb{S}^{q+}} \bcancel{0}^{-\alpha}\,\overset{*}{\underline{\bcancel{P}}}$$

$$\underline{u} \quad \underline{t} \quad \underline{x} \quad \underline{v} \quad {}^{u:t:x:v}\bcancel{D} \begin{matrix} \underline{\overset{+}{u}} \\ \underline{t} \\ \underline{\overset{+}{x}} \\ \underline{\overset{+}{v}} \end{matrix} = \frac{\underline{u}\underline{\overset{+}{u}} - \underline{t}^{2}}{H^{q}_{x:v}} + H^{p}_{x:v}\left(\underline{x}\underline{\overset{+}{x}} + \underline{v}\underline{\overset{+}{v}}\right) = \frac{\underline{u}\underline{\overset{+}{u}} - \underline{t}^{2}}{H^{q}_{x:v}} + H^{p}_{x:v}\left(\underline{\ulcorner x{:}v \urcorner}^{2} + \ulcorner x{:}v \urcorner^{2}\underline{\mathbb{S}}^{q+}_{\llcorner x:v \lrcorner}\right)$$

$${}^{q-1}_{\text{mg}}\text{brane}: \quad H^{p+q}_{x:u} = 1 + \frac{N}{\ulcorner x{:}u \urcorner^{p}} = \bcancel{0}^{2/\alpha}$$

$$\underline{u} \quad \underline{t} \quad \underline{x} \quad \underline{v} \quad {}^{u:t:x:v}\bcancel{D} \begin{matrix} \underline{\overset{+}{u}} \\ \underline{t} \\ \underline{\overset{+}{x}} \\ \underline{\overset{+}{v}} \end{matrix} = \frac{\underline{v}\underline{\overset{+}{v}} - \underline{t}^{2}}{H^{p}_{x:u}} + H^{q}_{x:u}\left(\underline{x}\underline{\overset{+}{x}} + \underline{u}\underline{\overset{+}{u}}\right) = \frac{\underline{v}\underline{\overset{+}{v}} - \underline{t}^{2}}{H^{p}_{x:u}} + H^{q}_{x:u}\left(\underline{\ulcorner x{:}u \urcorner}^{2} + \ulcorner x{:}u \urcorner^{2}\underline{\mathbb{S}}^{p+}_{\llcorner x:u \lrcorner}\right)$$

$$\mathcal{L}^{q}_{\cancel{D}:-\cancel{0}:} \quad d^{-1} * d\cancel{p}$$

$$d\,\underline{\cancel{p}} = \underline{\mathbb{S}}^{p+}_{\llcorner x:u \lrcorner} \Longrightarrow Q_{\mathrm{mg}} = \int_{\underline{\mathbb{S}}^{p+}_{\llcorner x:u \lrcorner}}^{\mathbb{S}^{p+}} d\,\cancel{p}$$