$$\mathbb{R}^{1:d} \ni x^0 \cdot\cdot x^d$$

$$\not{k}^{+} = \not{p}_{M_0 \cdot\cdot M_k} \underline{x}^{M_0} \wedge \cdots \wedge \underline{x}^{M_k}$$

$$\mathcal{L}^k \left(g{:}\varphi{:}\not{k}^+\right) = \sqrt{-g}\left(R - \frac{1}{2}\overset{2}{\ulcorner\Phi\urcorner} - \frac{1}{2\,(k+2)!}\overset{2}{\ulcorner\underline{\not{k}}^+\urcorner}\exp\left(-\sqrt{2}\sqrt{1-k+\frac{k+1}{d-1}\Phi}\right)\right)$$

$${}^{t:x}\backslash k_+ = \backslash k_+^{0} :\cdots: \backslash k_+^{d}$$

$$\mathcal{L}_k^{g:\varphi:\not{k}^+}\left(\gamma{:}\backslash k_+\right) = \frac{1}{2}\sqrt{-\gamma}\left(k-1-\gamma^{ij}\left(\backslash k^+ \ltimes g\right)_{ij}\exp\left(-\sqrt{\frac{1-k}{1+k}+\frac{1}{d-1}\Phi}\right)\right) - \backslash k_+ \ltimes \not{k}^+$$

$p+q=d-3$ dual pair

$(p{:}q)$ solution

$$\mathcal{L}^p\left(g{:}\varphi{:}\not{p}^+\right) + \mathcal{L}_p^{g:\varphi:\not{p}^+}\left(\gamma{:}\backslash p_+\right)$$

$$\mathcal{L}^q\left(g{:}-\varphi{:}\underline{\bar{*}}\not{p}^+\right)$$

$$\frac{\alpha^2}{2} = 2 - \frac{(p+1)\,(q+1)}{d-1} = 1-p+\frac{p+1}{d-1} = 1-q+\frac{q+1}{d-1}$$

el p brane $t{:}\overset{p}{x}{:}r{:}\overset{q}{y}{:}\overset{2}{s}$

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

$$d\,s_{d+}^2 = \frac{\underline{t}^{\,2} - \underline{x}^2}{H_{q+}^{q\,+\,/d-}} + H_{q+}^{p\,+\,/d-}\,\overbrace{\underline{r}^2 + r^2\underline{v}_{q\,+\,2}^2}$$

$$H_{q+}^{\alpha} = \mathfrak{e}^{-2\varphi}$$

$$\mathfrak{e}^{-\alpha\varphi} * \underline{\not{p}}^+ = \underline{\mathbb{S}}^{q\,+\,2} \Longrightarrow \int_{ys}^{\mathbb{S}^{q\,+\,2}} \mathfrak{e}^{-\alpha\varphi} * \underline{\not{p}}^+$$

mg q brane $t{:}\overset{q}{y}$

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

$$d\,s^{2}_{d+} = \frac{\underline{t}^{\,2} - \underline{y}^{2}}{H_{p+}^{p\,+\,/d-}} + H_{p+}^{q\,+\,/d-}\,\overbrace{\underline{r}^{2} + r^{2}\underline{v}^{2}_{p\,+\,2}}$$

$$H^{\alpha}_{p+} = \mathfrak{e}^{2\varphi}$$

$$\underline{\not{p}}^{\,+} = \underline{\mathbb{S}}^{p\,+\,2} \Longrightarrow \int_{xs}^{\mathbb{S}^{p\,+\,2}} \underline{\not{p}}^{\,+}$$