

$$I = (4\pi\kappa)^{1-\frac{d}{2}} \Gamma\left(s + \frac{d}{2} + \frac{k}{4} - 1\right) \\ \times \sum_{\text{BPS}} {}_2F_1\left(s - \frac{k}{4}, s + \frac{d}{2} + \frac{k}{4} - 1; 2s; \frac{4\kappa}{P_L^2}\right) \left(\frac{P_L^2}{4\kappa}\right)^{1-s-\frac{d}{2}-\frac{k}{4}}$$