Extra dimensions at the LHC

Black hole production at the LHC

The Schwarzschild radius R_S of an $(4+n)$-dimensional black hole is given by

$$R_S = \frac{1}{\sqrt{\pi}M_{\mathrm{Pl}}} \left[\frac{M_{\mathrm{BH}}}{M_{\mathrm{Pl}}} \left(\frac{8\Gamma\left(\frac{n+3}{2}\right)}{n+2} \right) \right]^{\frac{1}{n+1}}, \tag{1}$$

assuming that extra dimensions are large ($\gg R_S$). Calculate the production cross section for a black hole of mass M_{BH} given a Plack mass M_{Pl} in n-dimensions. Assume $M_{\mathrm{Pl}} \sim \mathcal{O}(1-5)\mathrm{TeV}$.

Hint:

Assume a geometrical cross section for parton scattering at an extended object such as a black hole. For additional hints you may want to consult the original reference *Phys.Rev.Lett.87:161602,2001. e-Print: hep-ph/0106295* for the cross section computation.