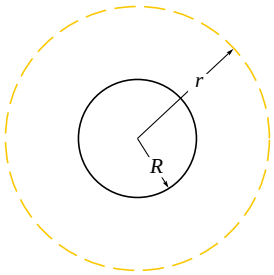
Field due to a pipe of charge

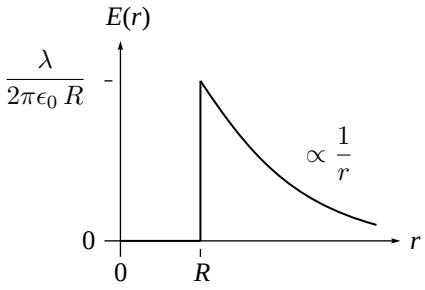


By symmetry, $\vec{E}(\vec{r})$ depends only on the distance r from the tube axis and is directed radially away from the axis. Use a Gaussian surface as in LSM figure 6.30, page 255:

$$\Phi = E(r)(2\pi r\, L) = \frac{Q_{\text{inside}}}{\epsilon_0}.$$

(a.) For $r > R$, $Q_{\text{inside}} = \lambda L$, so $E(r) = \dfrac{\lambda}{2\pi\epsilon_0\, r}$.

(b.) For $r < R$, $Q_{\text{inside}} = 0$, so $E(r) = 0$.



Grading: 2 points for any sort of sketch
2 points for symmetry statement
2 points application of Gauss's law
1 point for result **(a.)**
1 point for result **(b.)**
2 points for graph