axial symetry

$$d\Phi = \vec{E} \cdot d\vec{A} = 0$$

$$\Phi_{cap} = \int_{cap} \vec{E} \cdot d\vec{A} = 0$$

$$d\Phi = \vec{E} \cdot d\vec{A} = E_r(r) dA$$

$$\begin{aligned} \Phi_{can} &= \int_{can} E_r(r) dA \\ &= E_r(r) A_{can} = E_r(r) 2\pi r L \end{aligned}$$

$$q_{enc} = \lambda L = \epsilon_0 \Phi_{tot} = \epsilon_0 E_r(r) 2\pi r L$$