El campo de la corona en el eje z

$$E_z(z\hat{z}) = -2\pi \frac{k\sigma_0\, z}{\sqrt{z^2 + r'^2}}\Big|_a^b = 2\pi k\sigma_0\, z\left(\frac{1}{\sqrt{z^2 + a^2}} - \frac{1}{\sqrt{z^2 + b^2}}\right)$$

En el límite

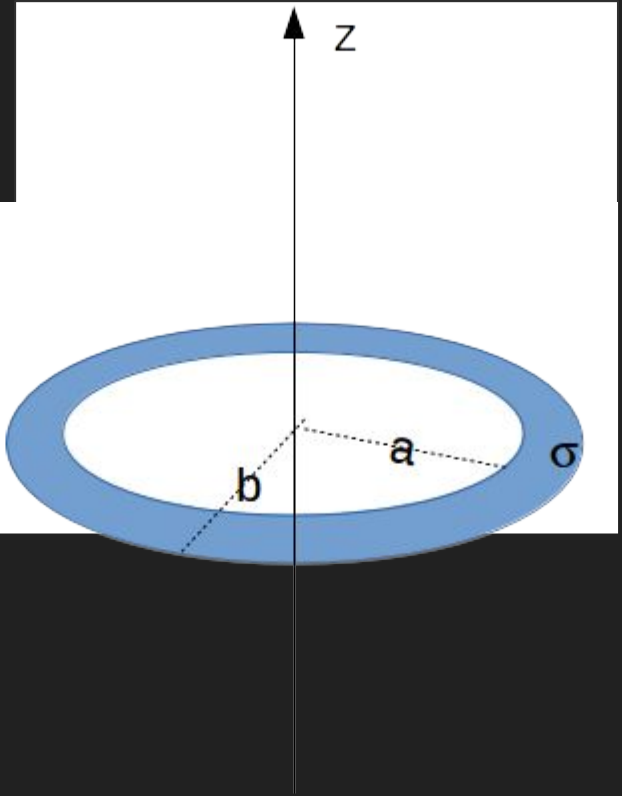
$$\sigma_0 * \pi(b^2 - a^2) = 2\pi\lambda b$$

$$\sigma_0 * \pi(b - a)(b + a) = 2\pi\lambda b$$

$$a \to b$$

$$\sigma_0(b - a) * \pi 2b = 2\pi\lambda b$$

$$\sigma_0(b - a) \to \lambda$$



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$$\sigma_0 * \pi(b^2 - a^2) = 2\pi\lambda b$$

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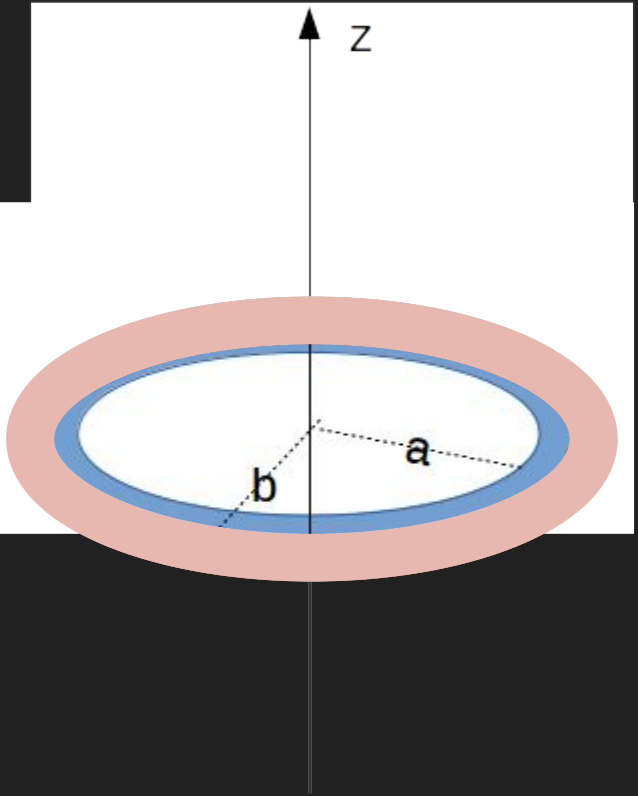

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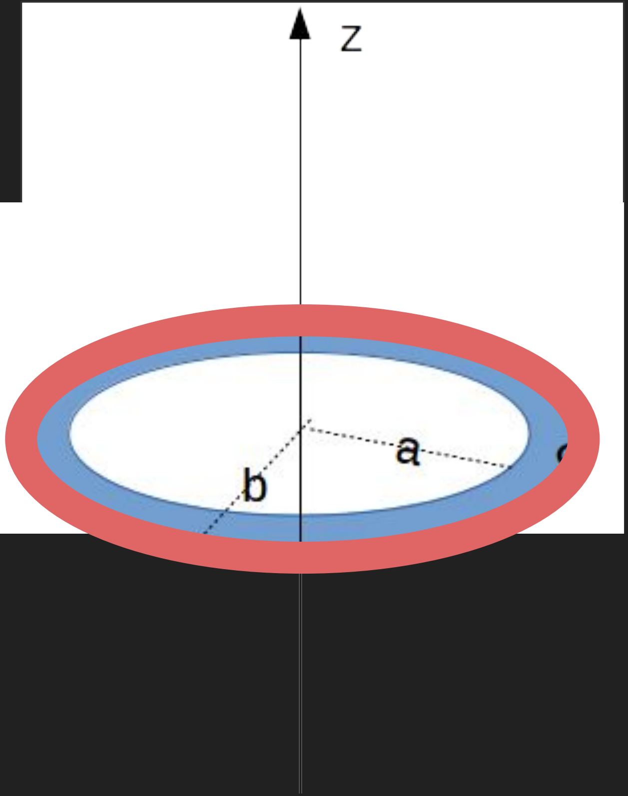
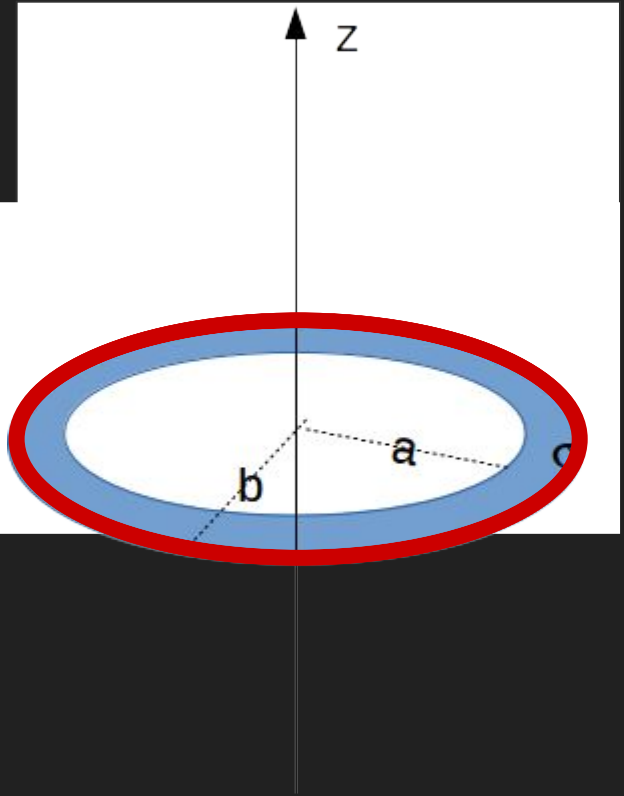


En el límite

$$\sigma_0 * \pi(b^2 - a^2) = 2\pi\lambda b$$
$$\sigma_0 * \pi(b - a)(b + a) = 2\pi\lambda b$$
$$a \rightarrow b$$
$$\sigma_0(b - a) * \pi 2b = 2\pi\lambda b$$
$$\sigma_0(b - a) \rightarrow \lambda$$



En el límite

$$E_z(z\hat{z}) = 2\pi k\sigma_0\, z\left(\frac{1}{\sqrt{z^2+a^2}} - \frac{1}{\sqrt{z^2+b^2}}\right)$$

$$a \rightarrow b \;\; \sigma_0 \rightarrow \infty \;\; y \;\left(\frac{1}{\sqrt{z^2+a^2}} - \frac{1}{\sqrt{z^2+b^2}}\right) \rightarrow 0$$

En el límite

$$E_z(z\hat{z}) = 2\pi k\sigma_0\, z\left(\frac{1}{\sqrt{z^2+a^2}} - \frac{1}{\sqrt{z^2+b^2}}\right)$$

$$a \to b \;\; \sigma_0 \to \infty \;\; y \;\left(\frac{1}{\sqrt{z^2+a^2}} - \frac{1}{\sqrt{z^2+b^2}}\right) \to 0$$

Debemos salvar la indeterminacin '$0.\infty$'.

En el límite

Debemos salvar la indeterminacin '$0.\infty$'.

$$E_z(z\hat{z}) = 2\pi k\sigma_0\, z\Big(\frac{\sqrt{z^2+b^2}-\sqrt{z^2+a^2}}{\sqrt{z^2+a^2}\sqrt{z^2+b^2}}\Big)$$

$$\Big(\frac{\sqrt{z^2+b^2}-\sqrt{z^2+a^2}}{\sqrt{z^2+a^2}\sqrt{z^2+b^2}}\Big) = \Big(\frac{\sqrt{z^2+b^2}-\sqrt{z^2+a^2}}{\sqrt{z^2+a^2}\sqrt{z^2+b^2}}\Big)\Big(\frac{\sqrt{z^2+b^2}+\sqrt{z^2+a^2}}{\sqrt{z^2+b^2}+\sqrt{z^2+a^2}}\Big)$$

$$\Big(\frac{\sqrt{z^2+b^2}-\sqrt{z^2+a^2}}{\sqrt{z^2+a^2}\sqrt{z^2+b^2}}\Big)\Big(\frac{\sqrt{z^2+b^2}+\sqrt{z^2+a^2}}{\sqrt{z^2+b^2}+\sqrt{z^2+a^2}}\Big) = \Big(\frac{(z^2+b^2)-(z^2+a^2)}{(\sqrt{z^2+a^2}\sqrt{z^2+b^2})(\sqrt{z^2+b^2}+\sqrt{z^2+a^2})}\Big)$$

En el límite

$$E_z(z\hat{z}) = 2\pi k\sigma_0\, z\Big(\frac{b^2 - a^2}{(\sqrt{z^2+a^2}\sqrt{z^2+b^2})(\sqrt{z^2+b^2}+\sqrt{z^2+a^2})}\Big)$$

$$E_z(z\hat{z}) = 2\pi k\sigma_0\,(b-a)z\Big(\frac{b+a}{(\sqrt{z^2+a^2}\sqrt{z^2+b^2})(\sqrt{z^2+b^2}+\sqrt{z^2+a^2})}\Big)$$

$$a \to b \;\; \sigma_0(b-a) \to \lambda$$

$$a \to b \;\; E_z(z\hat{z}) \to 2\pi k\Big(\frac{\lambda z b}{(z^2+b^2)^{3/2}}\Big)$$

Verifiquen calculando el campo del anillo de radio *b* y densidad de carga ***λ*** por definición.

En el límite

$$\left(\sigma_0 \frac{(b+a)(b-a))}{\sqrt{z^2+a^2}\sqrt{z^2+b^2}}\right)$$

$$\left(\sigma_0 \frac{(b+a)(b-a))}{\sqrt{z^2+a^2}\sqrt{z^2+b^2}}\right) \to \frac{\lambda(2b)}{z^2+b^2}$$