Eletromagnetismo

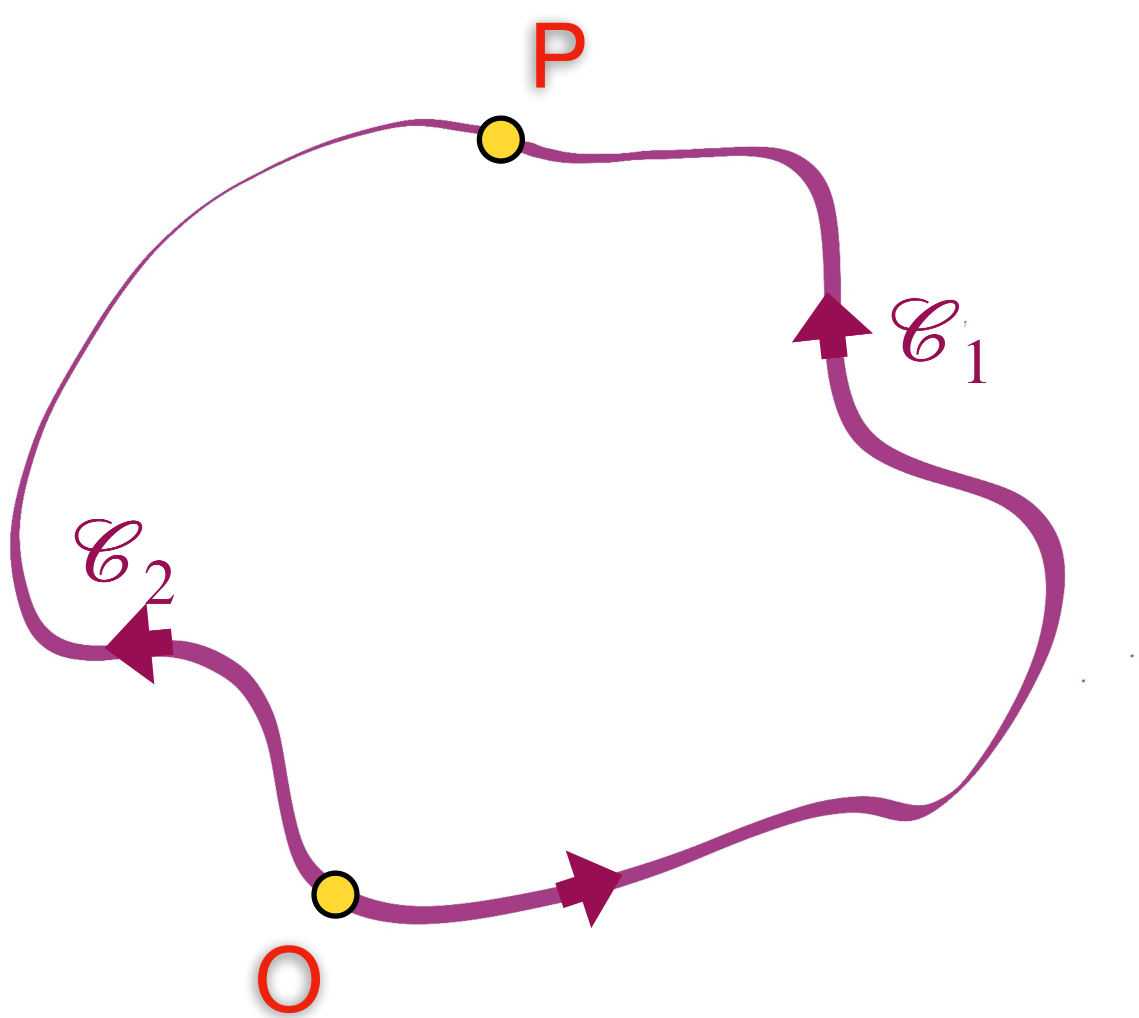
9 de abril
Eletrostática

Potencial eletrostático

$$\vec{\nabla} \times \vec{\mathbf{E}} = 0$$

$$\underset{\mathscr{C}_1}{\int_O^P \vec{\mathbf{E}} \cdot d\vec{\ell}} = \underset{\mathscr{C}_2}{\int_O^P \vec{\mathbf{E}} \cdot d\vec{\ell}}$$

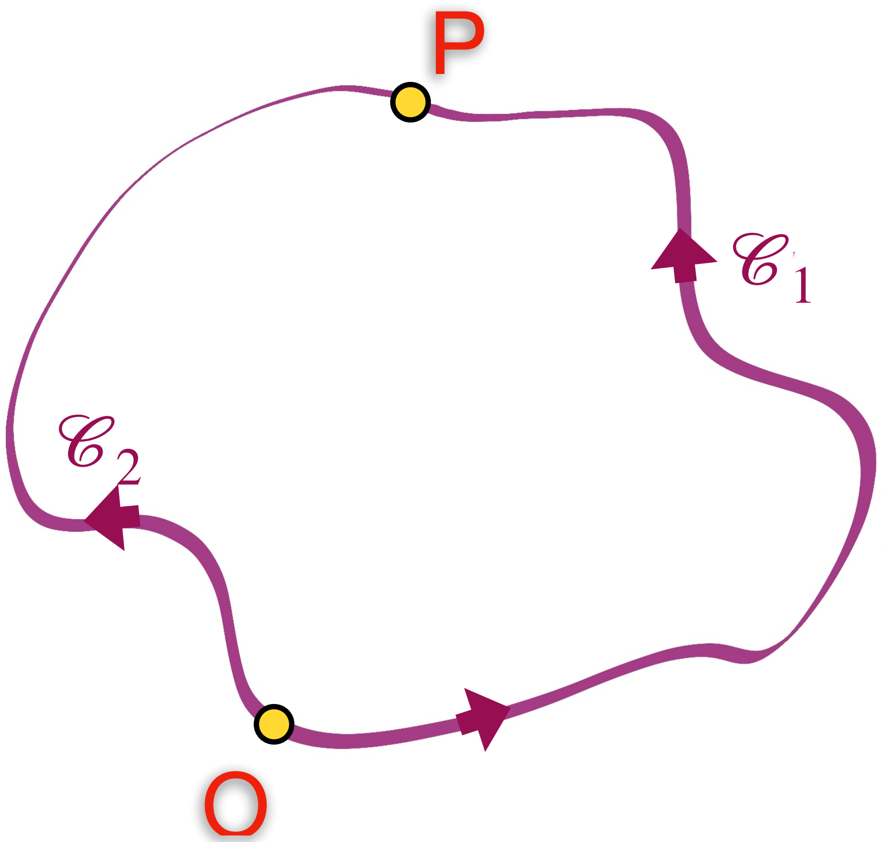
$$V(P) = -\int_O^P \vec{\mathbf{E}} \cdot d\vec{\ell}$$



Potencial eletrostático

$$V(P) = -\int_O^P \vec{\mathbf{E}} \cdot \mathrm{d}\vec{\ell}$$

$$V(P) - V(O) = \int_O^P \vec{\boldsymbol{\nabla}} V \cdot \mathrm{d}\vec{\ell}$$



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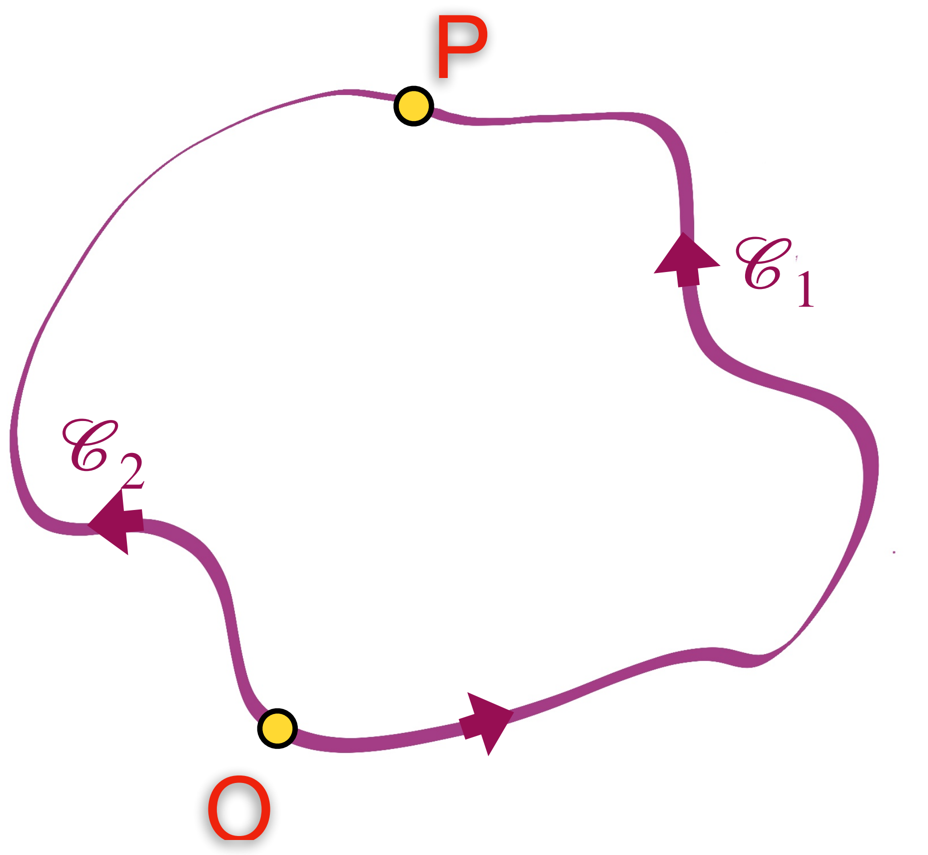

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$$\vec{\mathbf{E}} = -\vec{\boldsymbol{\nabla}} V$$

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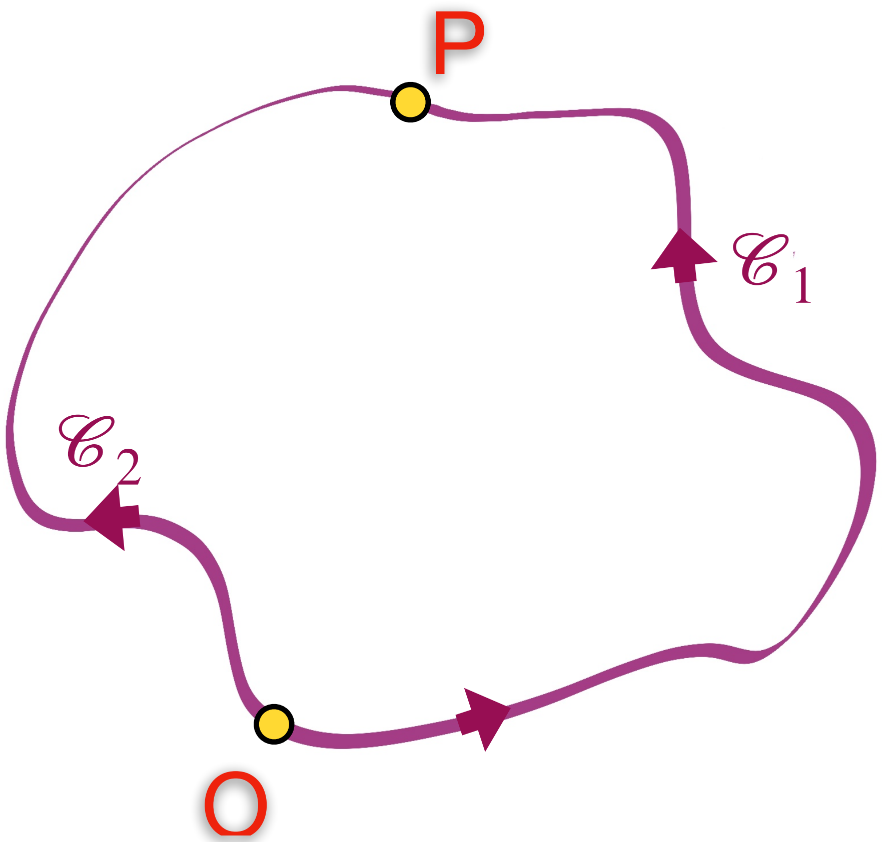

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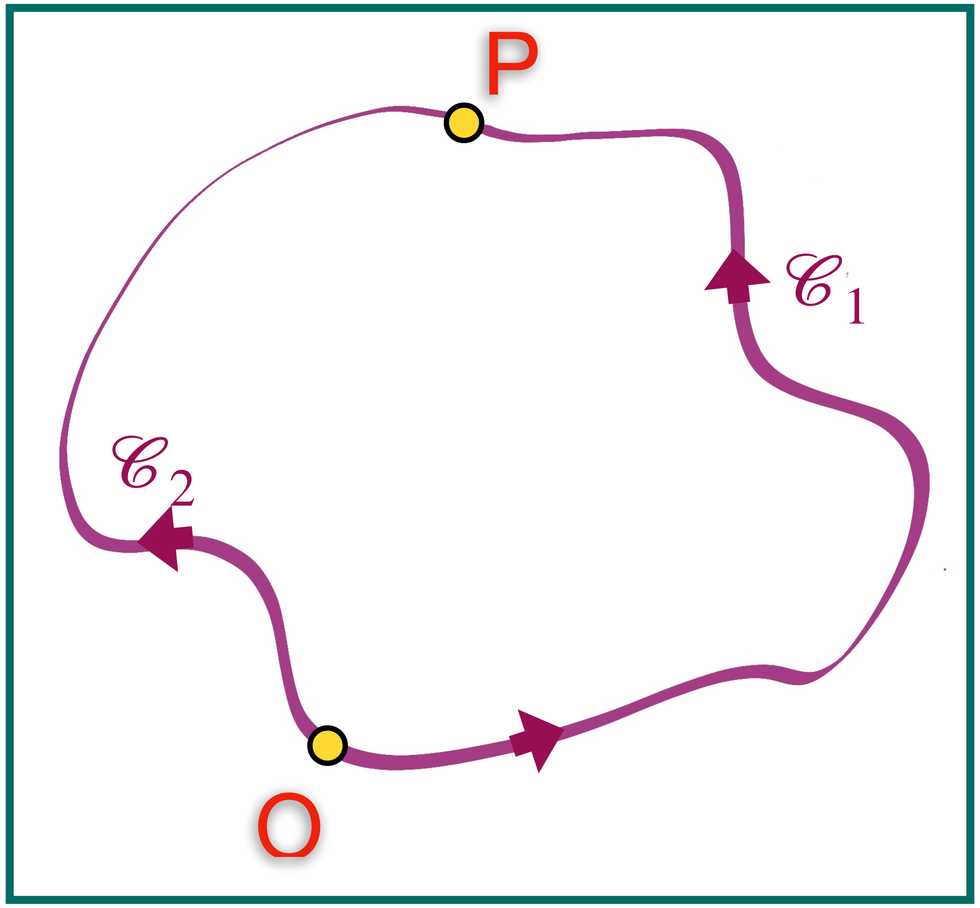
Escolha do ponto $\mathcal{O}$



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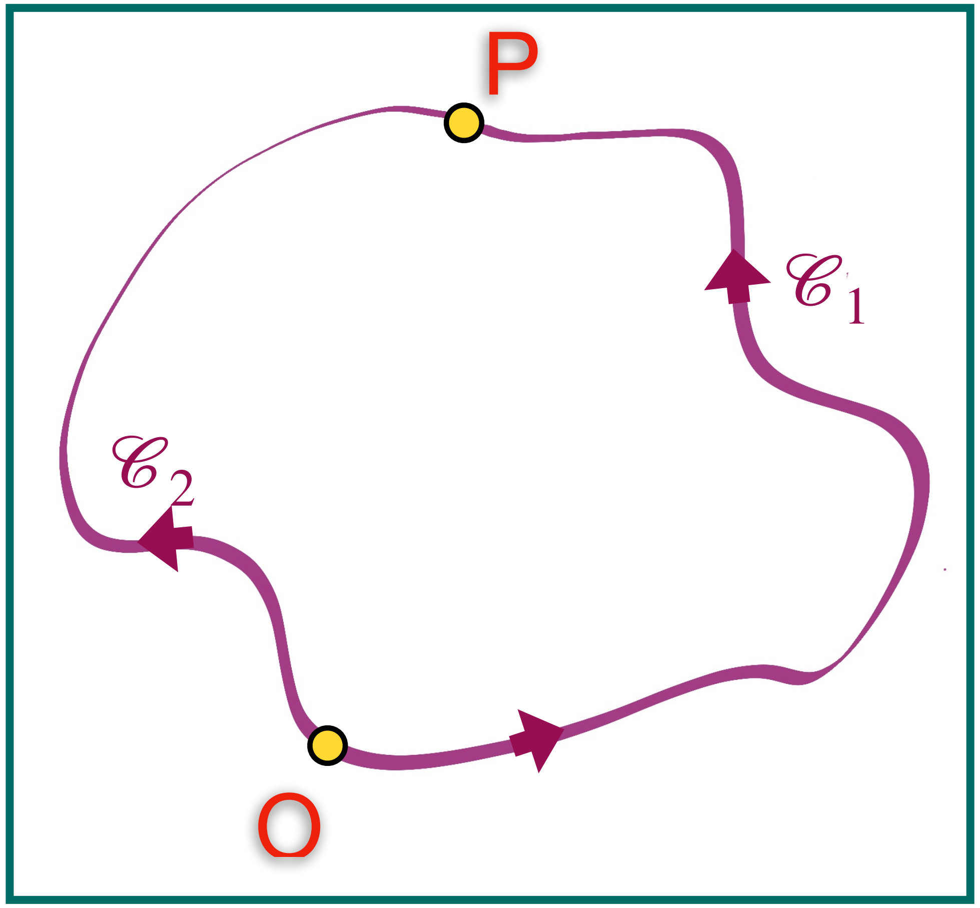
Escolha do ponto $\mathcal{O}$

- Via de regra, $\mathcal{O} \equiv \infty$



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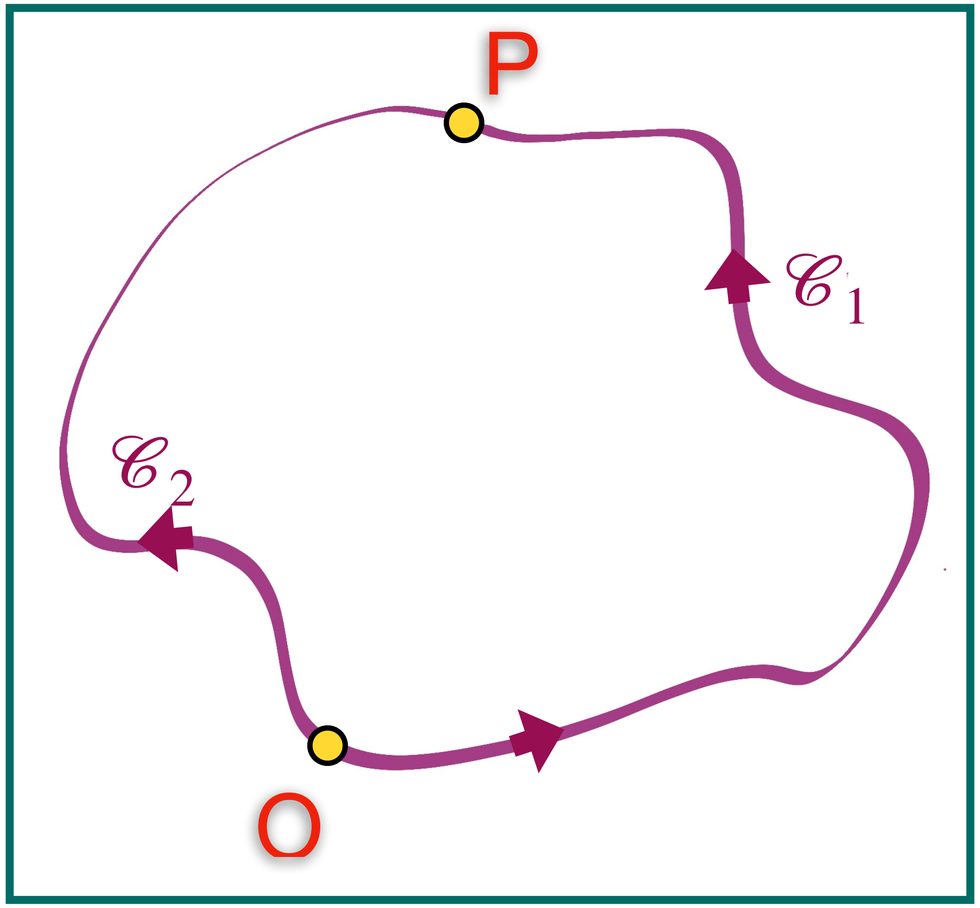

Escolha do ponto $\mathcal{O}$

- Via de regra, $\mathcal{O} \equiv \infty$
- Exceção
  - Cargas que vão até $\infty \Rightarrow$ escolher $\mathcal{O}$ conveniente

Potencial de carga pontual

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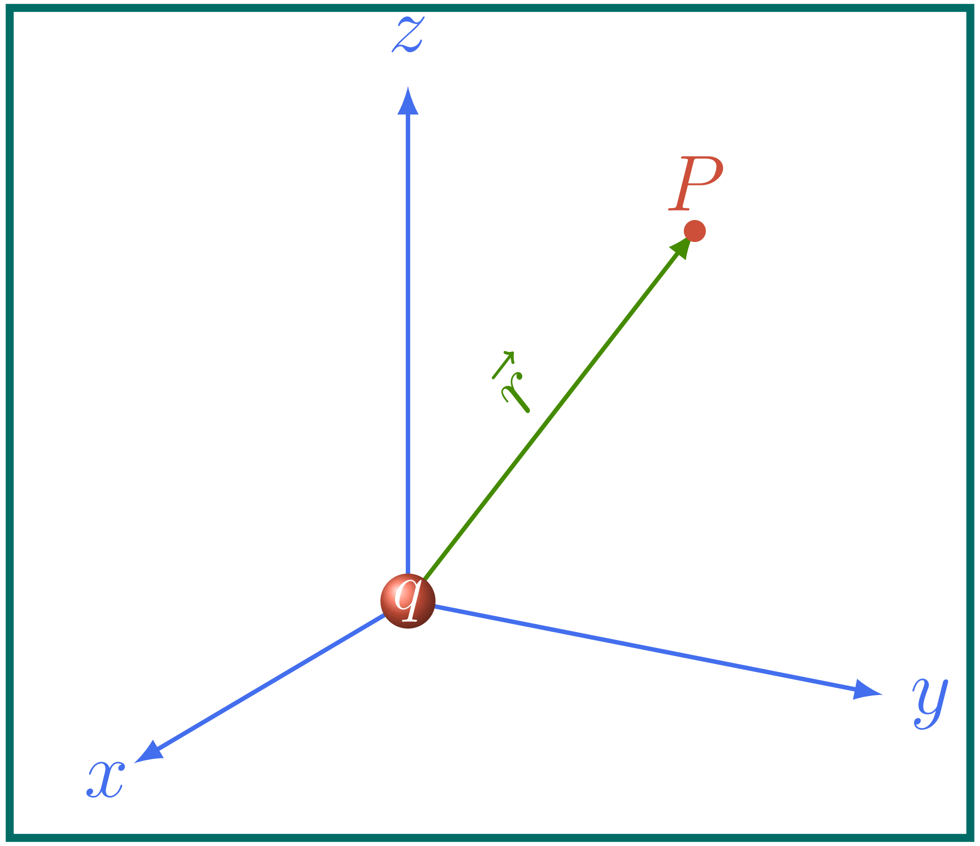
$\mathscr{O} \to \infty$

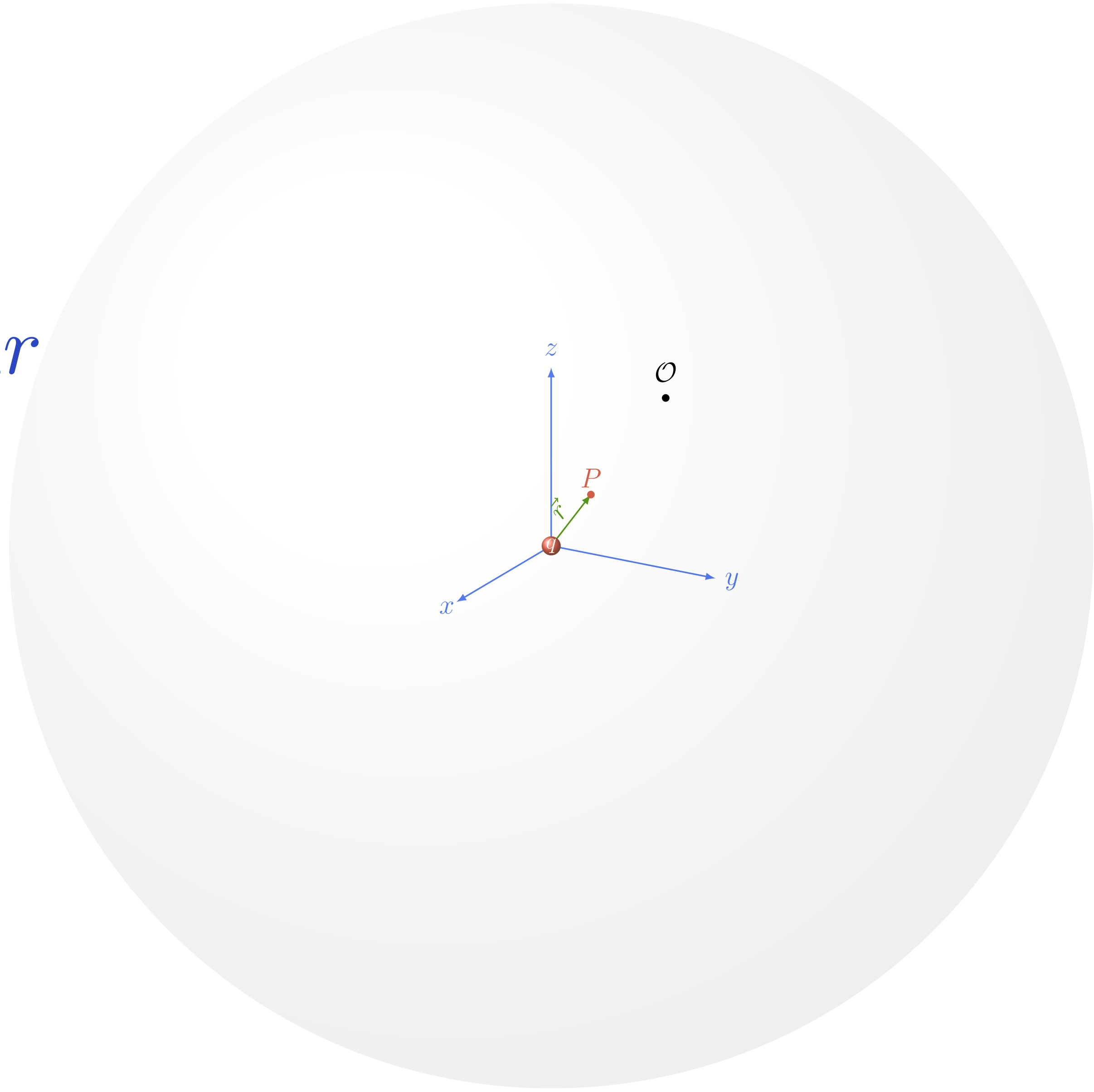


Potencial de carga pontual

$$V(P) = -\int_{O}^{P} \vec{\mathbf{E}} \cdot \mathrm{d}\vec{\ell}$$

$$\mathcal{O} \to \infty$$

$$V(\vec{\mathbf{r}}) = -\int_{\infty}^{r} \frac{1}{4\pi\epsilon_0} \frac{q}{r^3}\, \vec{\mathbf{r}} \cdot \hat{\mathbf{r}}\, \mathrm{d}r$$



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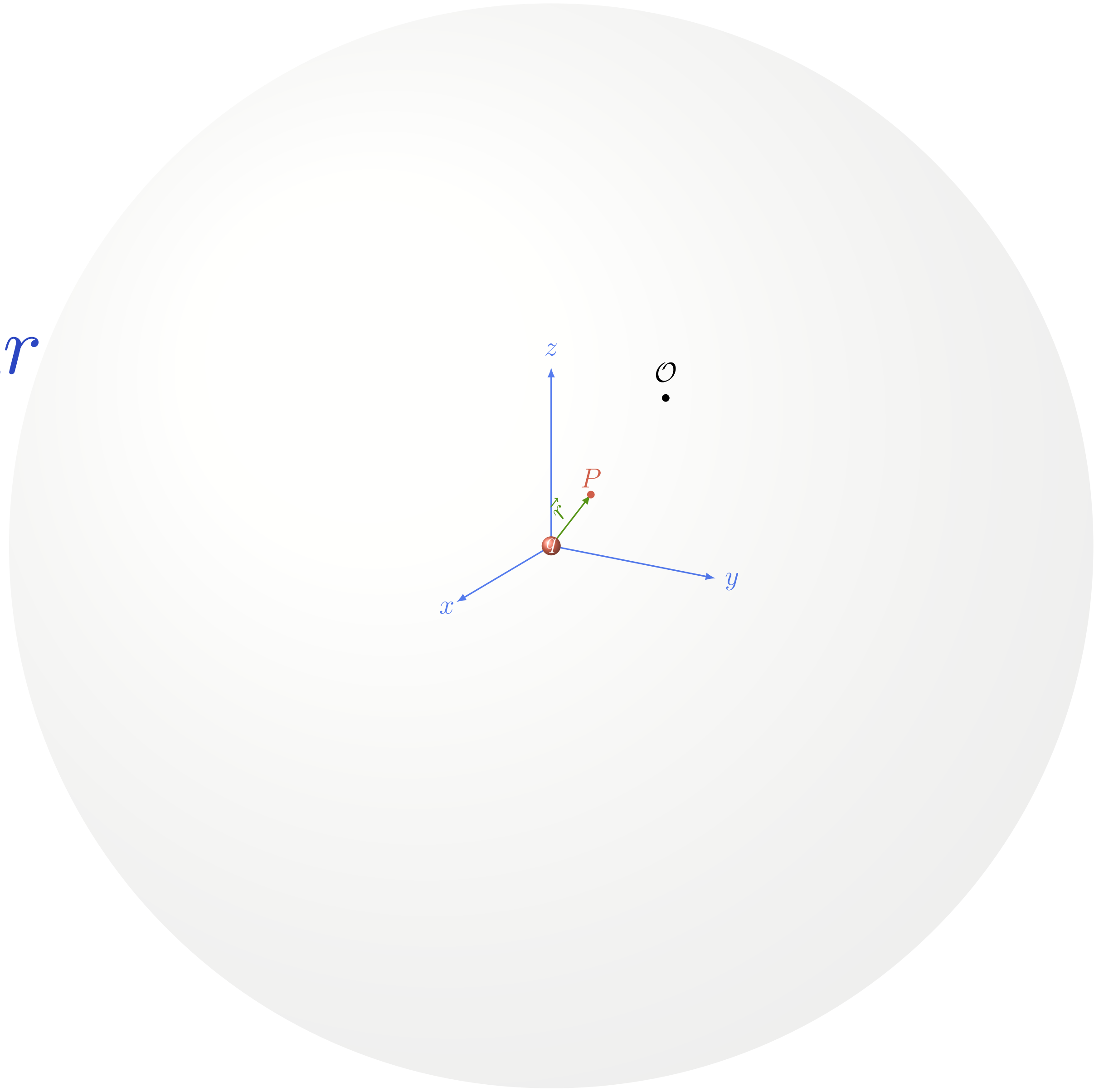

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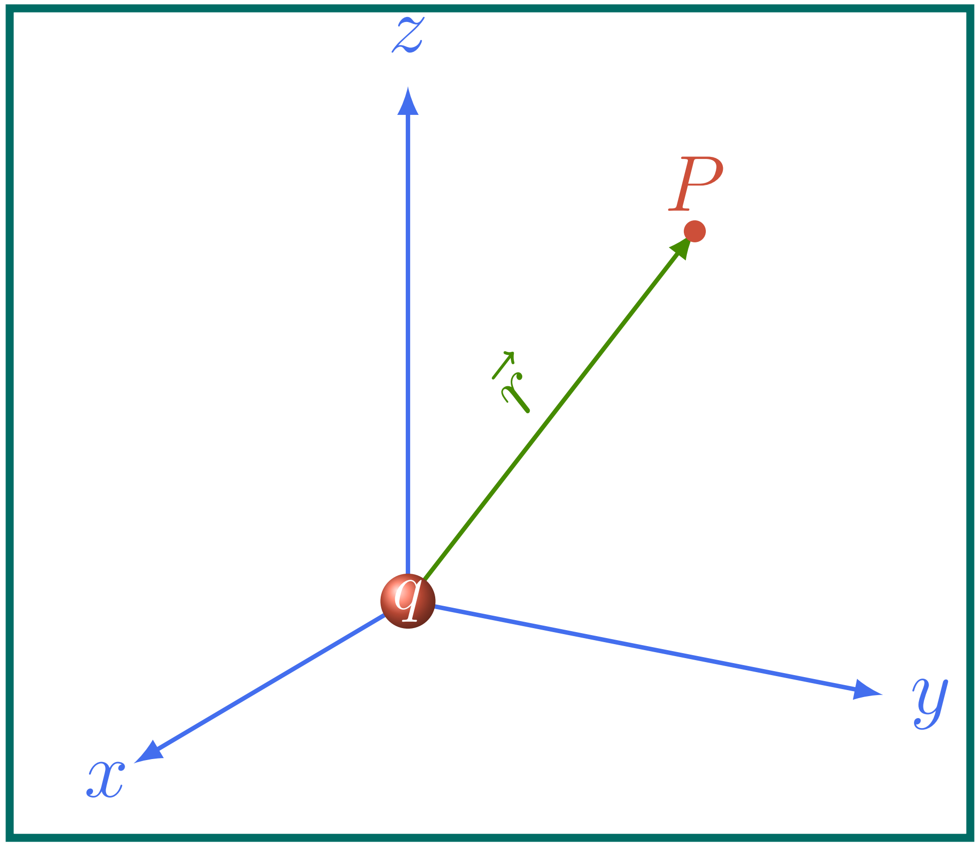

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$$V(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0} \frac{q}{r}$$

Potencial de carga pontual

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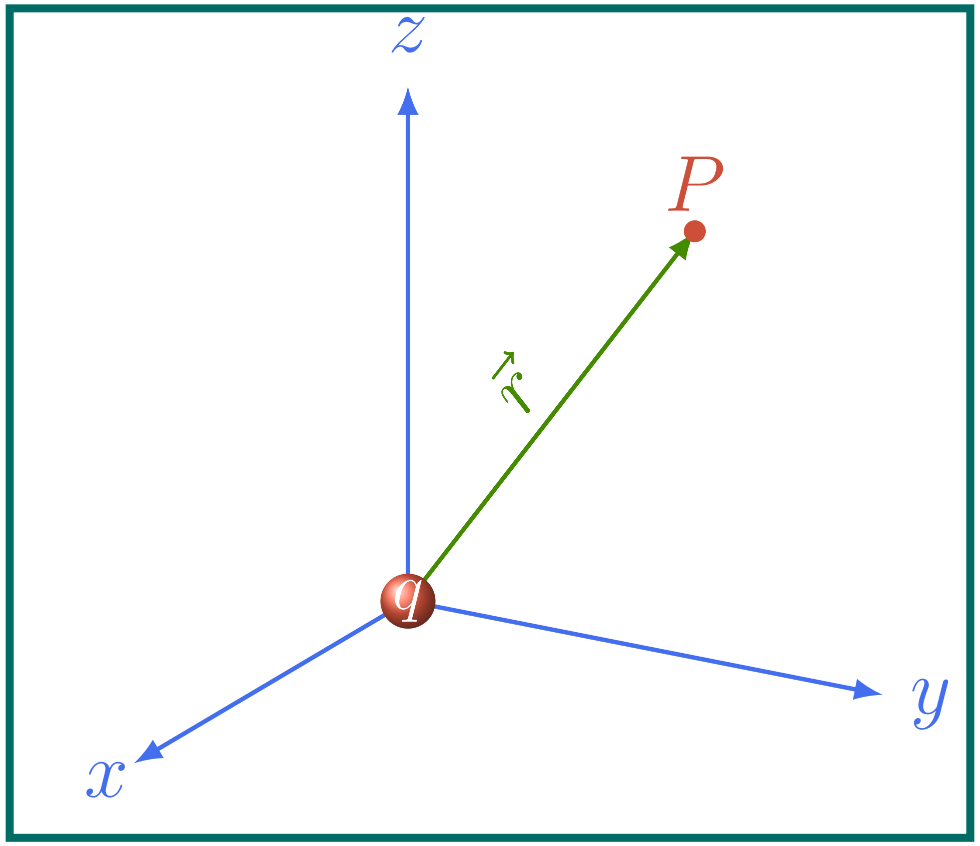

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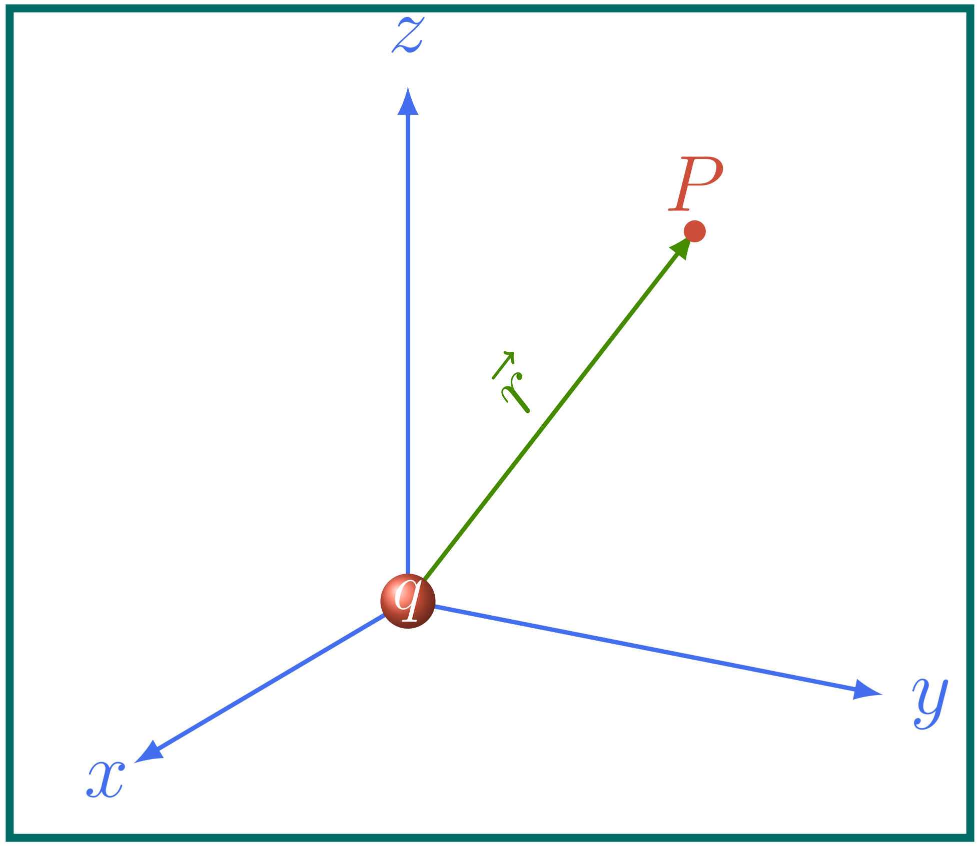

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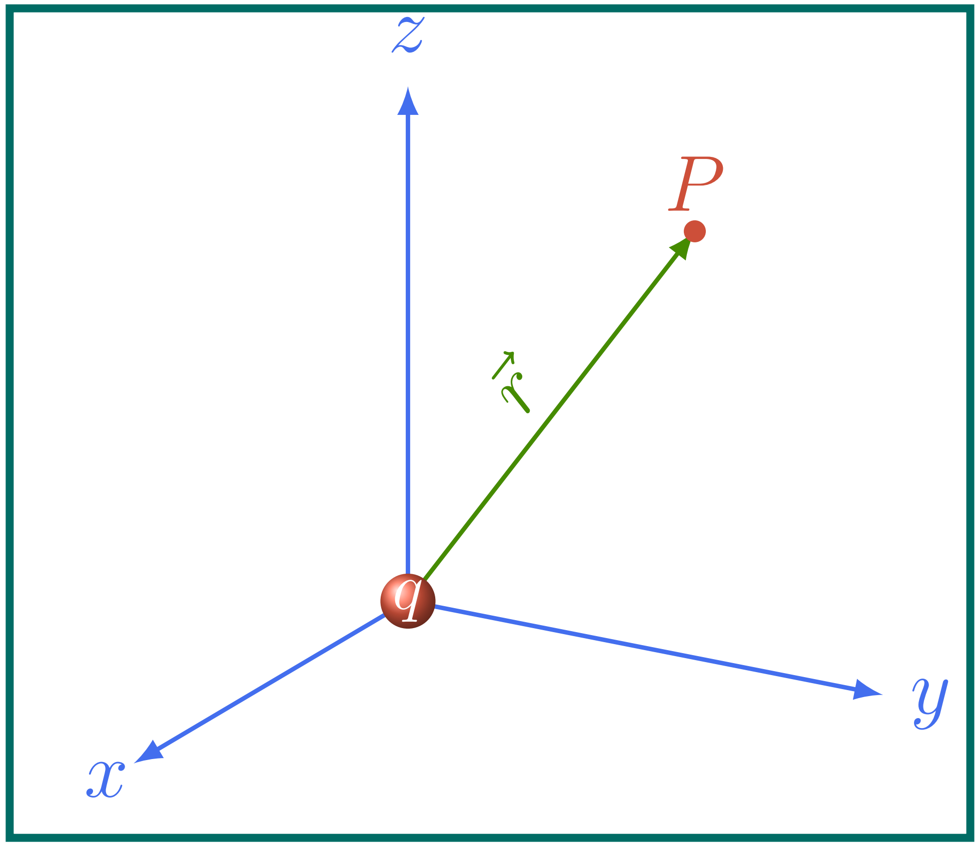

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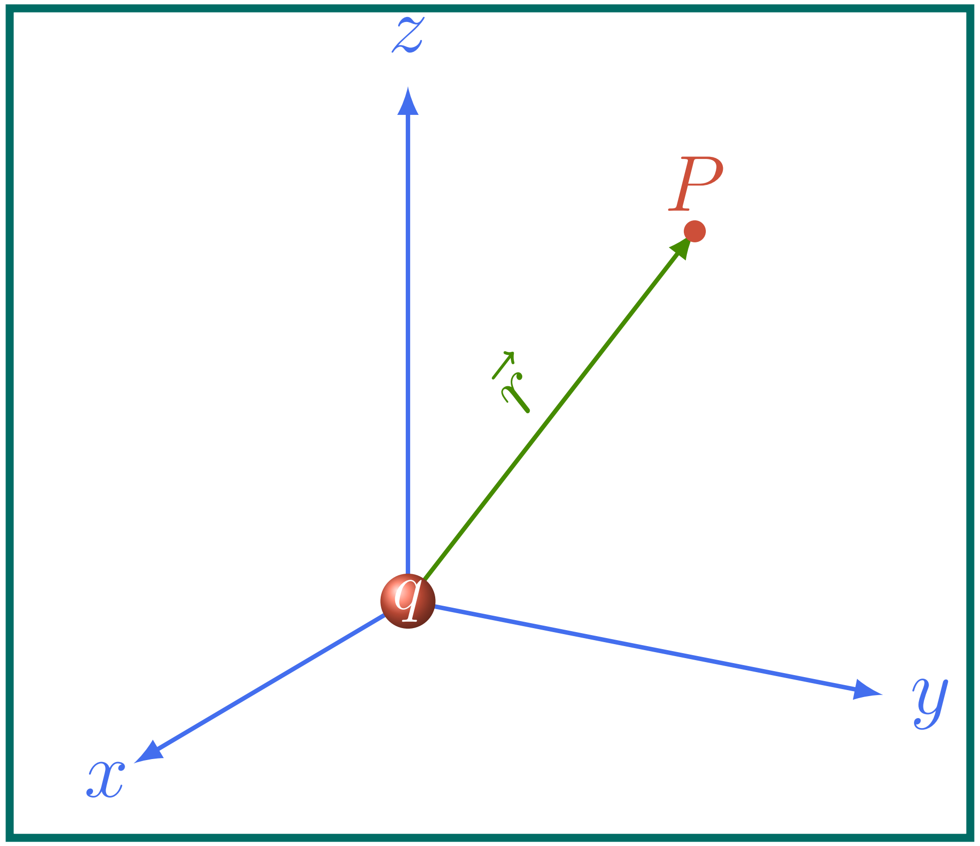

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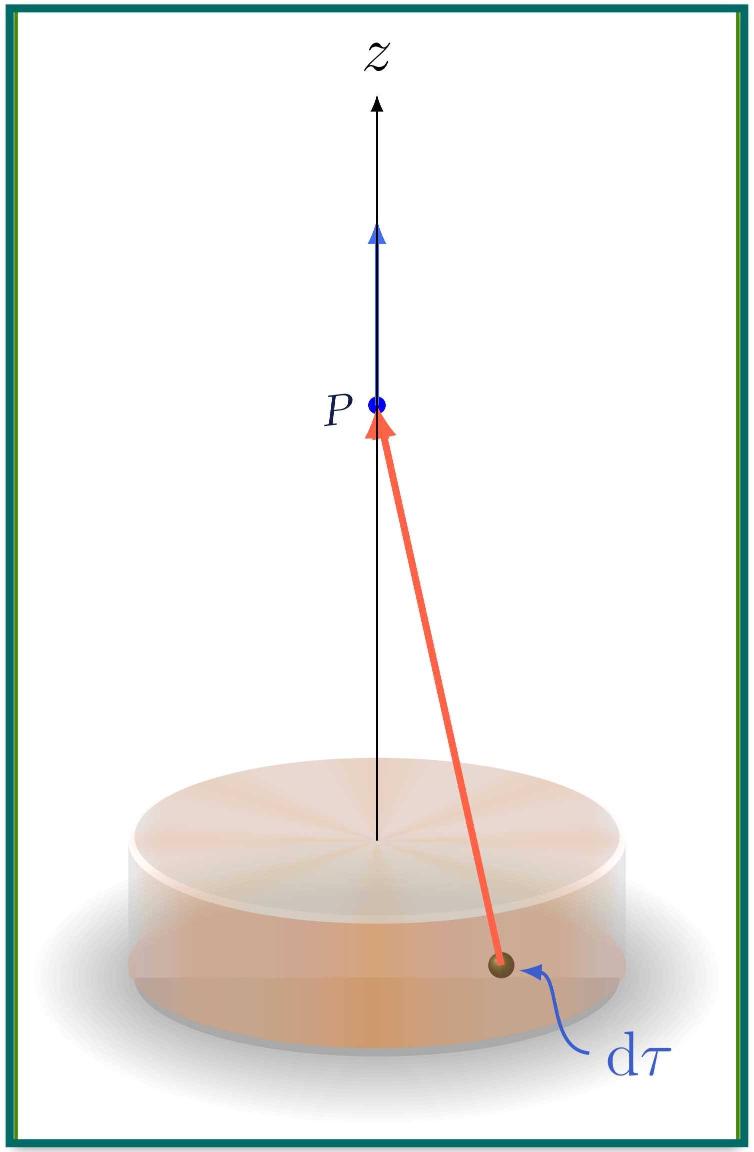
Potencial de distribuição de cargas

$$V(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0}\frac{q}{r}$$

$$\Rightarrow \quad V(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0}\int_{\mathcal{V}} \frac{1}{\mathscr{r}}\,\mathrm{d}q$$

$$\Rightarrow \quad V(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0}\int_{\mathcal{V}} \frac{\rho(\vec{\mathbf{r}}')}{\mathscr{r}}\,\mathrm{d}\tau'$$



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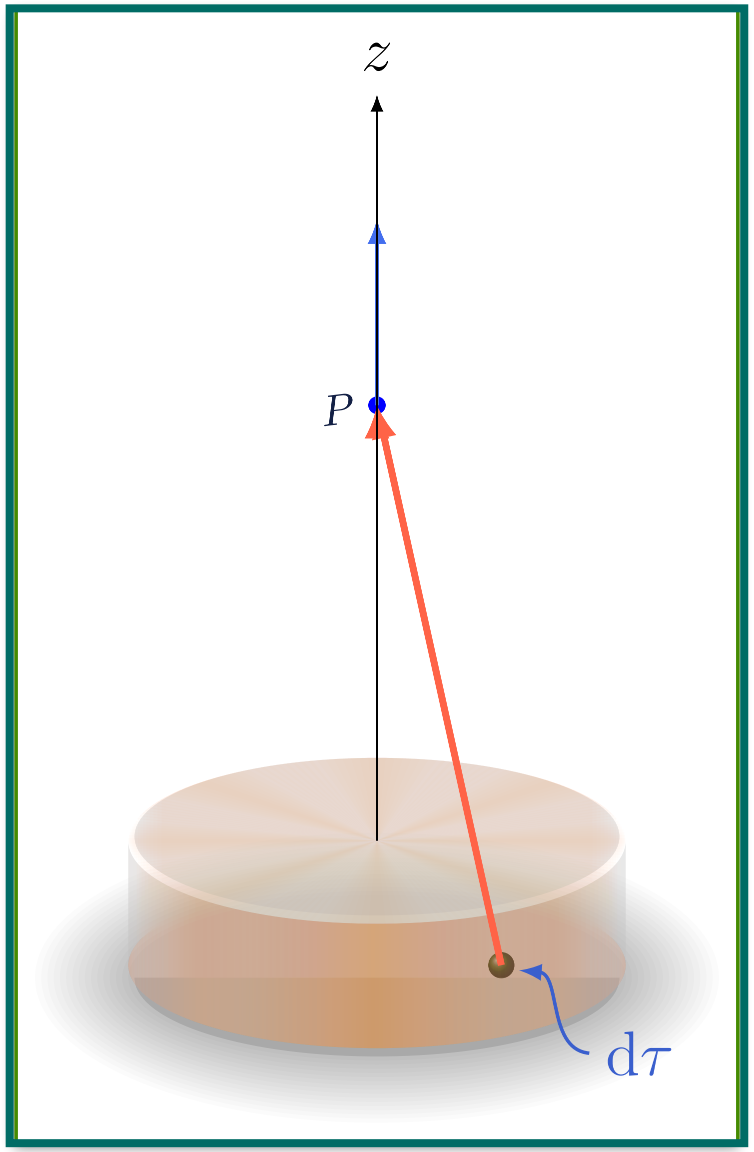

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Pratique o que aprendeu

$$V(\vec{r}) = \,?$$