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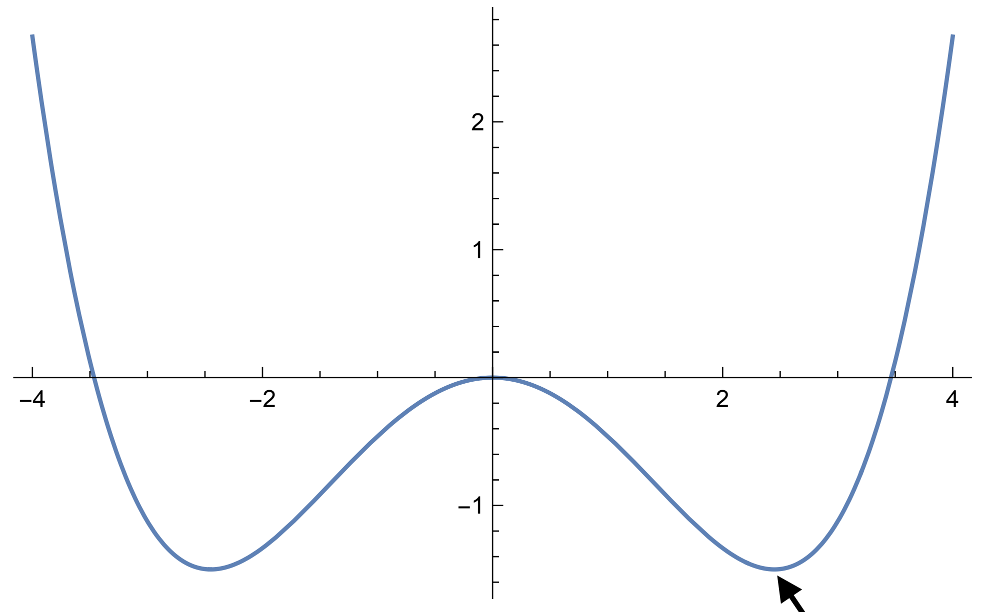

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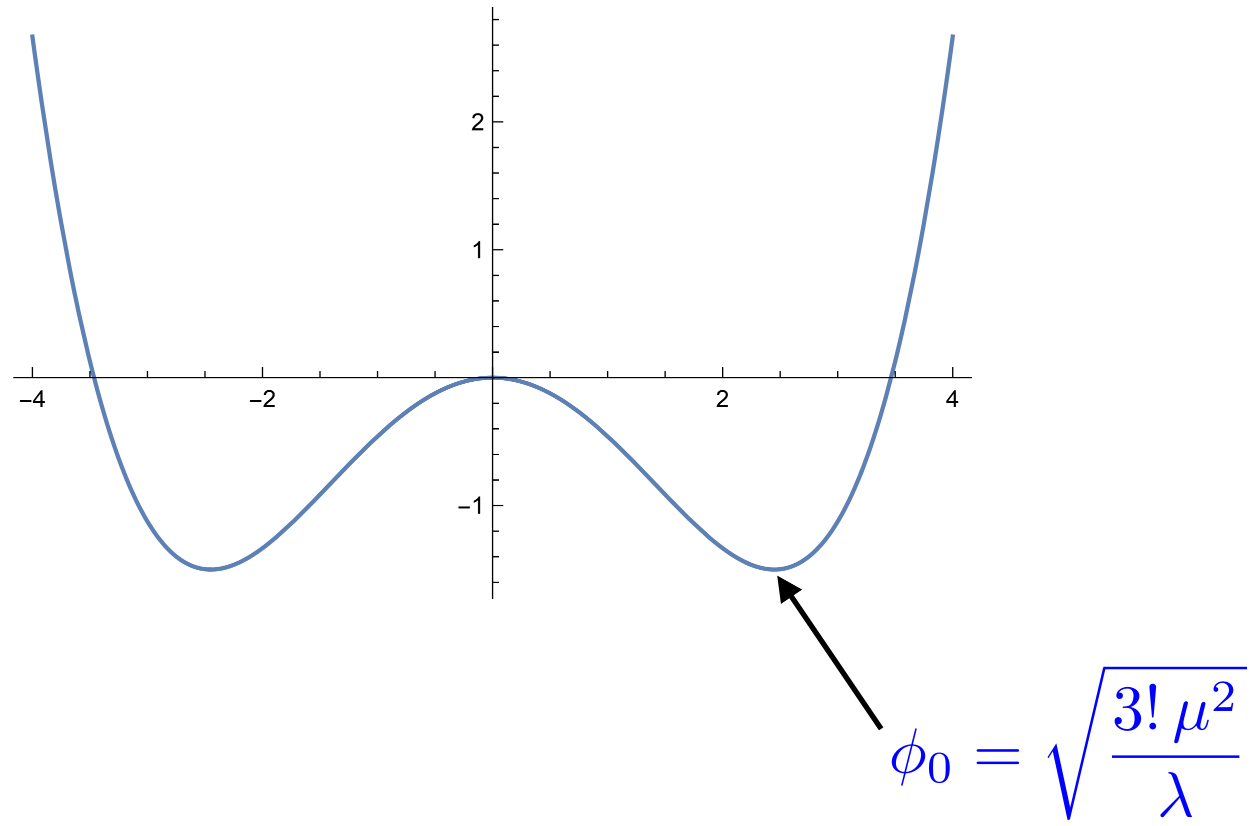

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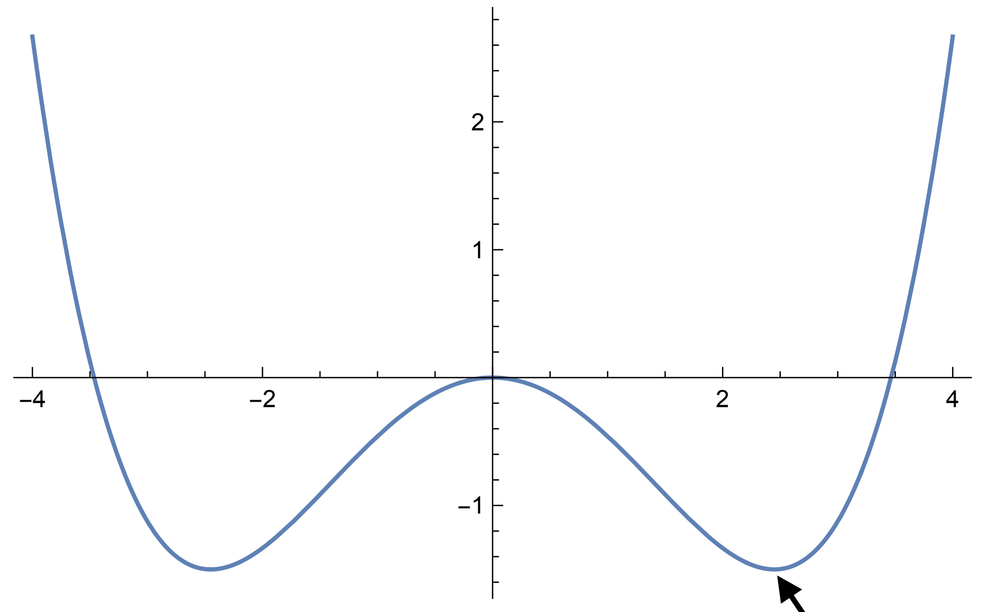

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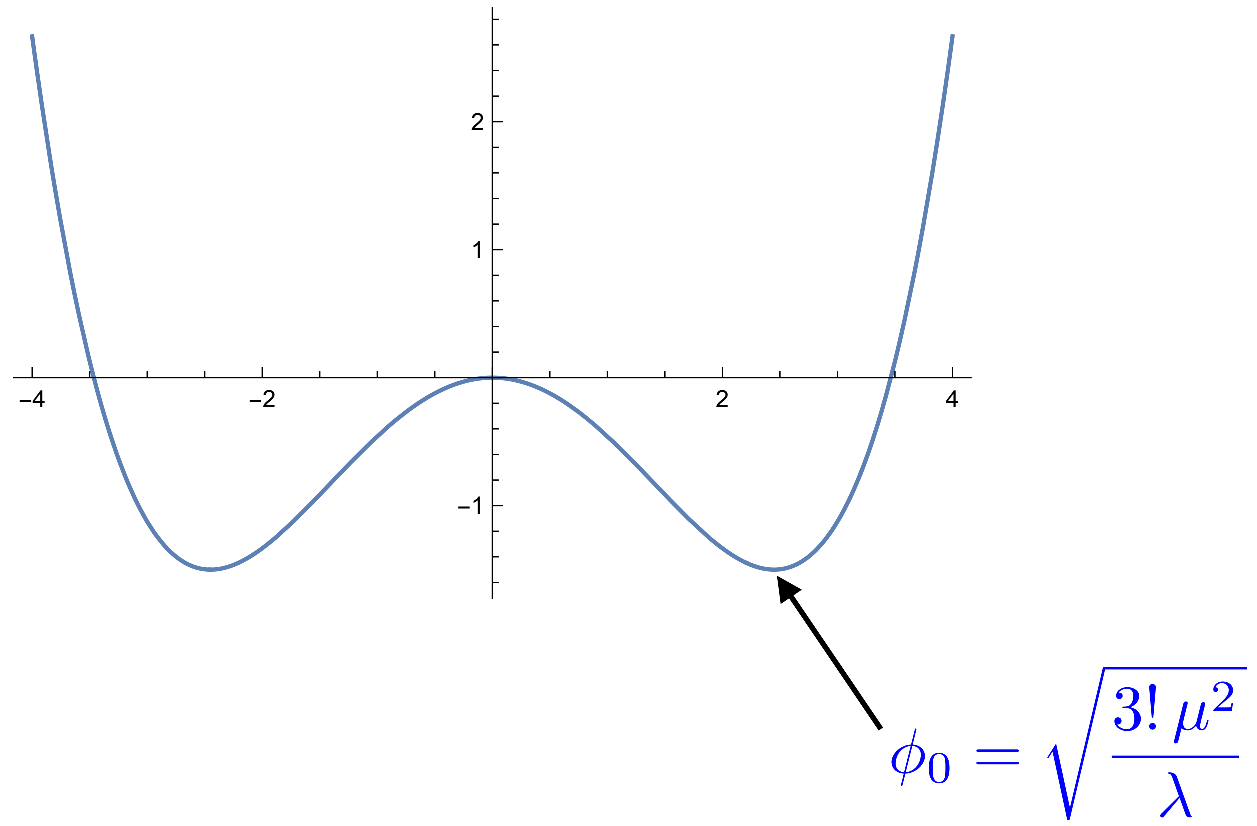

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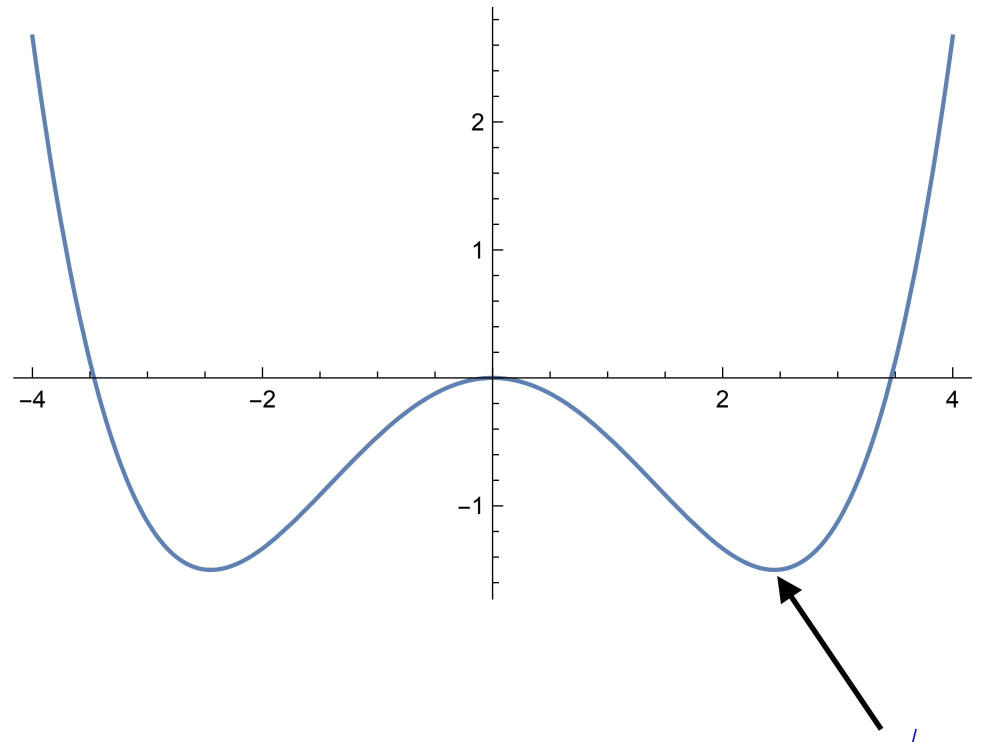

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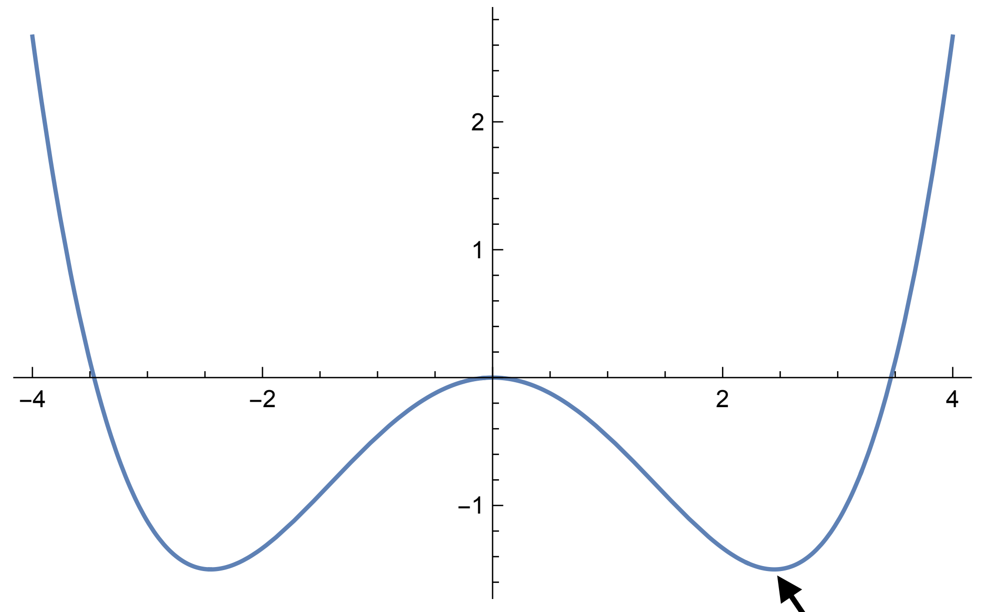

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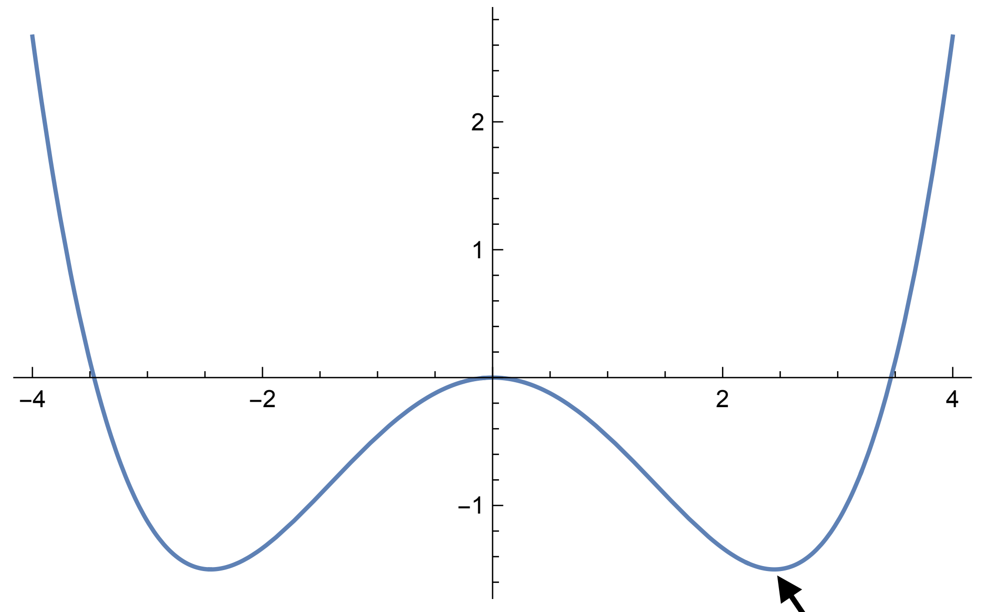

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Campo θ desapareceu (seria o bóson de Goldostone)

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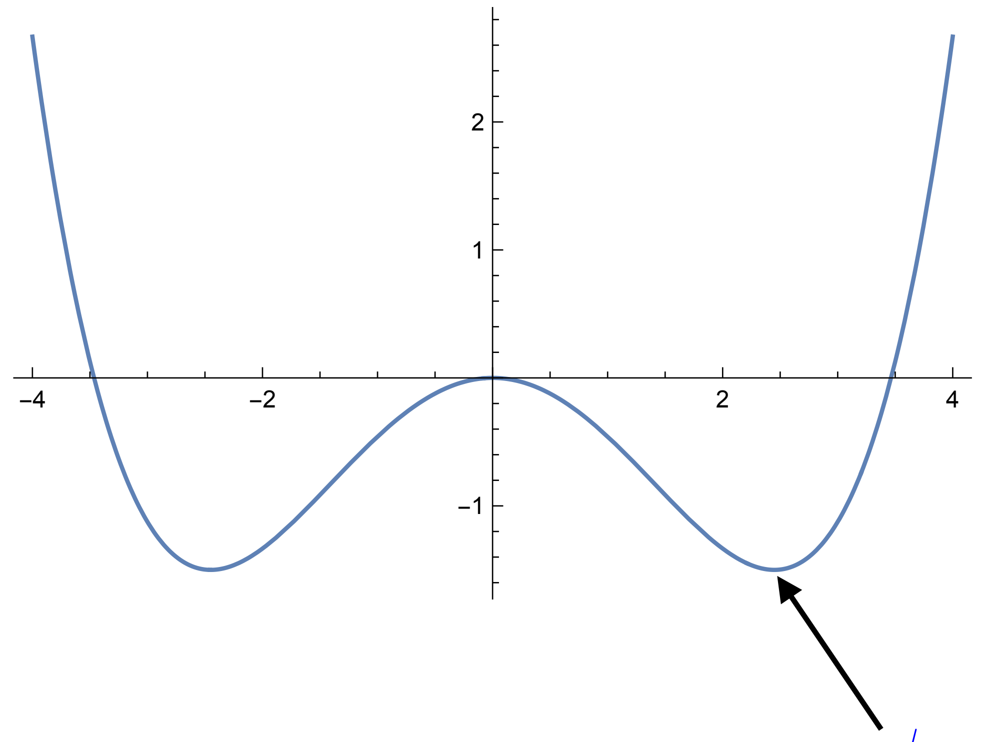

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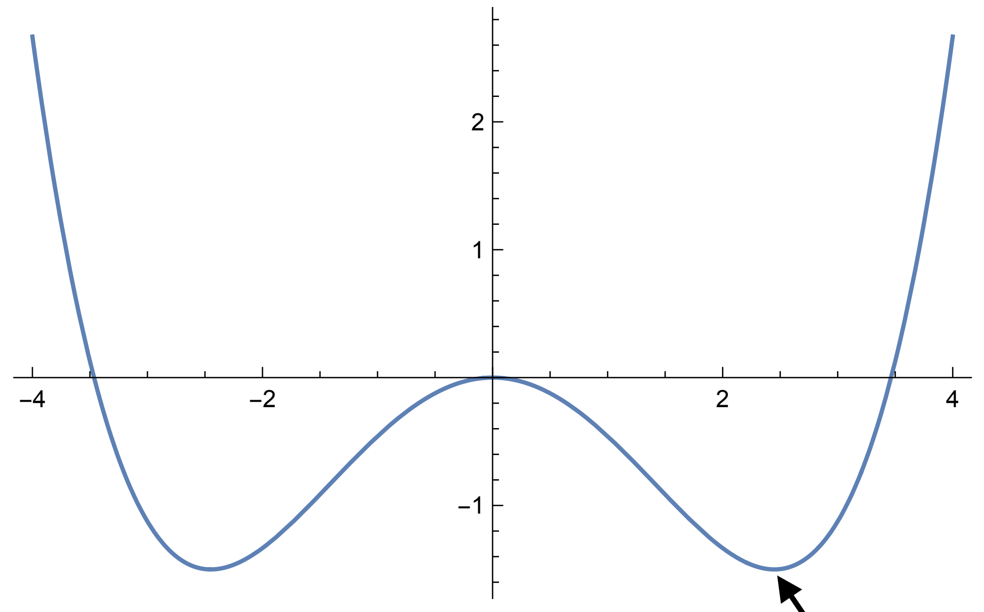

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Graus de liberdades físicos

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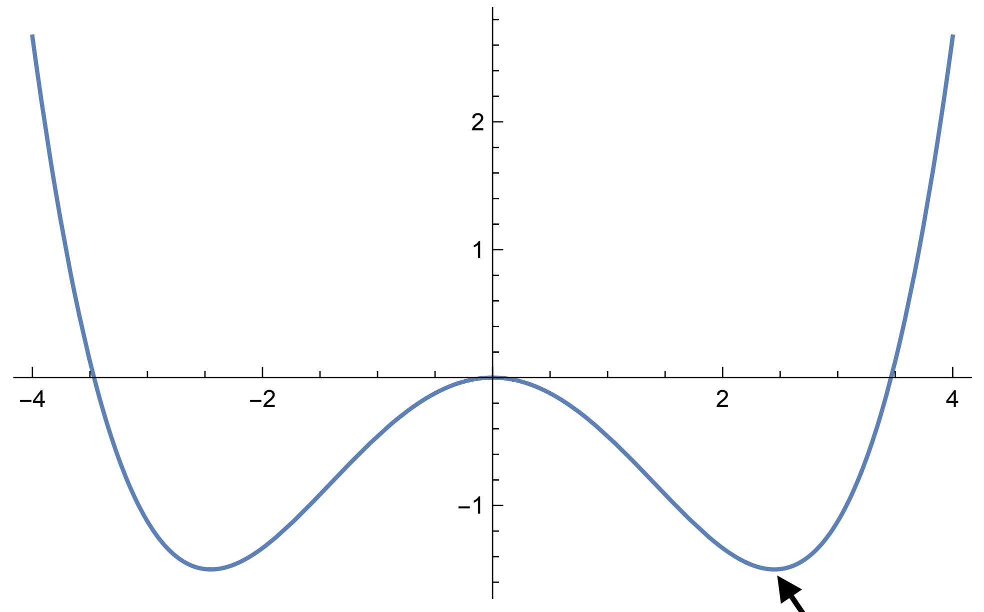

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Campo θ desapareceu (seria o bóson de Goldostone)

Antes: 2 de ϕ e 2 de A_μ

Graus de liberdades físicos

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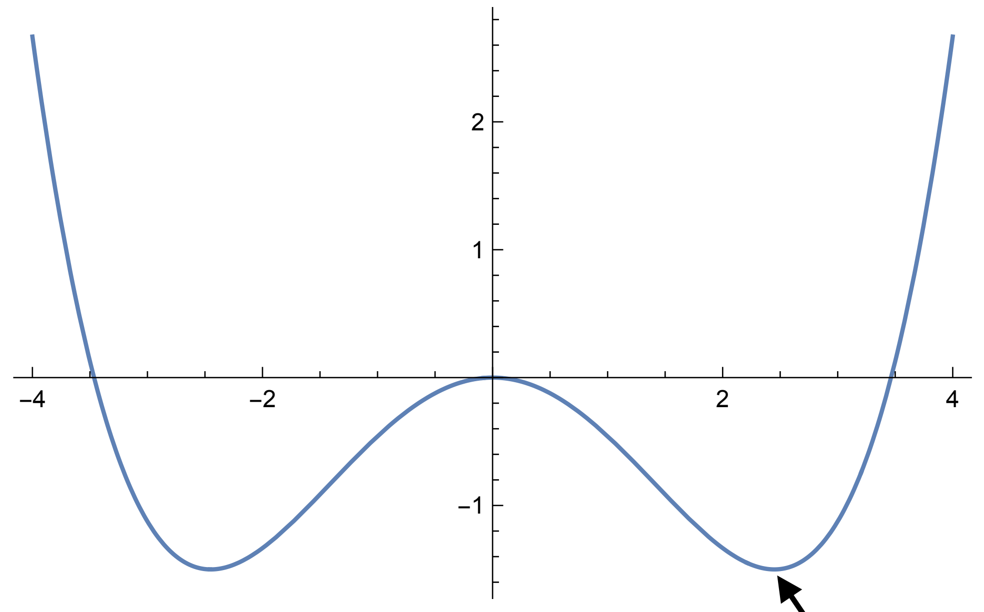

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Campo θ desapareceu (seria o bóson de Goldostone)

Não temos simetria $U(1)$ de gauge pois λ é real

Graus de liberdades físicos

Antes: 2 de ϕ e 2 de A_μ

Depois: 1 de λ e 3 de B_μ

Efeito Meissner

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Efeito Meissner

$$\mathcal{L} = -\frac{1}{4}\,F_{\mu\nu}\,F^{\mu\nu} + (D_\mu\phi)^\dagger\,D^\mu\phi - V(|\,\phi\,|)$$

vácuo $\quad D_\mu\phi \to 0 \qquad [D_\mu\,,\,D_\nu]\phi = i\,e\,F_{\mu\nu}\phi \qquad F_{\mu\nu} \to 0$

Supercondutividade $\quad i\,\hbar\,\partial_t\psi = \frac{1}{2\,m}\,p^2\,\psi \qquad \vec{p} = -i\,\hbar\,\vec{\nabla} - q\,\vec{A} \qquad \vec{J} = \frac{1}{2\,m}\,[(\vec{p}\psi)^*\,\psi - \psi^*\,\vec{p}\psi]$ corrente

$\psi = \rho\,e^{i\,\theta} \qquad \rho =$ constante $\qquad \vec{J} = \frac{\hbar}{m}\left[\vec{\nabla}\theta - \frac{q}{\hbar}\,\vec{A}\right]\rho^2 \qquad \vec{\nabla}\vec{A} = 0$ (gauge)

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