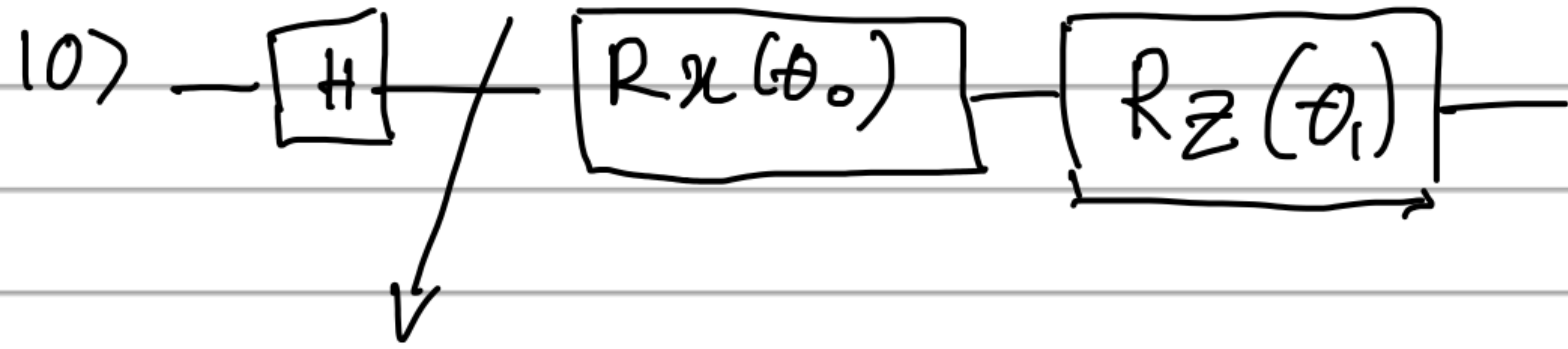
Let try this :



$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|0\rangle + |1\rangle\right)$$

$$= e^{-i\frac{\theta_1}{2}\sigma_z}\left(\cos\frac{\theta_0}{2} - i\sin\frac{\theta_0}{2}\sigma_x\right)$$

$$|\psi'\rangle = U(\theta_0,\theta_1)\,|\psi\rangle$$

$$= e^{-i\frac{\theta_1}{2}\sigma_z}\, e^{-i\frac{\theta_0}{2}\sigma_x}\,|\psi\rangle$$

$$\Rightarrow \partial_{\theta_0}|\psi'\rangle = \partial_{\theta_0} U(\theta_0,\theta_1)\,|\psi\rangle$$

$$= -\frac{i}{2}\sigma_x\, e^{-i\frac{\theta_1}{2}\sigma_z}\, e^{-i\frac{\theta_0}{2}\sigma_x}\,|\psi\rangle$$

$$= -\frac{i}{2}\sigma_x\, U(\theta_0,\theta_1)\,|\psi\rangle$$

$$= \frac{1}{2}\, U(\pi, 0)\, U(\theta_0,\theta_1)\,|\psi\rangle$$

$$= \frac{1}{2}\, U(\theta_0+\pi, \theta_1)\,|\psi\rangle$$

$$\partial_{\theta_1}|\psi'\rangle = \frac{1}{2}\, U(\theta_0, \theta_1+\pi)\,|\psi\rangle$$

QFIM

$$F_{00} = 4\,\mathrm{Re}\left(\langle \partial_{\theta_0} \psi' | \partial_{\theta_0} \psi' \rangle - |\langle \psi' | \partial_{\theta_0} \psi' \rangle|^2 \right)$$

$$= 4\,\mathrm{Re}\Big[\frac{1}{4} \langle \psi | U^\dagger(\theta_0+\pi, \theta_1)\, U(\theta_0+\pi, \theta_1) |\psi\rangle$$

$$- \frac{1}{4} \left| \langle \psi | U^\dagger(\theta_0, \theta_1)\, U(\theta_0+\pi, \theta_1) |\psi\rangle \right|^2 \Big]$$

$$= 4\,\mathrm{Re}\Big[\frac{1}{4} - \frac{1}{4} \Big| \langle \psi | \cancel{e^{i\frac{\theta_0}{2}\sigma_x}}\, \cancel{e^{i\frac{\theta_1}{2}\sigma_z}}\, \cancel{e^{-i\frac{\theta_1}{2}\sigma_z}}\, \cancel{e^{-i\frac{\theta_0}{2}\sigma_x}}\, e^{-i\frac{\pi}{2}\sigma_x} |\psi\rangle \Big|^2 \Big]$$

$$= 4\,\mathrm{Re}\left[\frac{1}{4} - \frac{1}{4} \left| \langle \psi | e^{-i\frac{\pi}{2}\sigma_x} |\psi\rangle \right|^2 \right]$$

$$= 4\,\mathrm{Re}\left[\frac{1}{4} - \frac{1}{4} \left| (-i) \frac{1}{\sqrt{2}} (\langle 0| + \langle 1|)\, \sigma_x\, \frac{1}{\sqrt{2}} (|0\rangle + |1\rangle) \right|^2 \right]$$

$$= 4\,\mathrm{Re}\left[\frac{1}{4} - \frac{1}{4} \left| (-i) \frac{1}{2} (\langle 0| + \langle 1|) (|1\rangle + |0\rangle) \right|^2 \right]$$

$$= 4\,\mathrm{Re}\left[\frac{1}{4} - \frac{1}{4} \left| (-i) \cdot \frac{1}{2} (2) \right|^2 \right]$$

$$= 4 \cdot \left(\frac{1}{4} - \frac{1}{4} \right) = 0$$

Similarly: $F_{11} = 1$.

8) $F_{01} = 4\mathrm{Re}\left[\langle \partial_{\theta_0}\psi' | \partial_{\theta_1}\psi'\rangle - \langle \partial_{\theta_0}\psi' | \psi'\rangle \langle \psi' | \partial_{\theta_1}\psi'\rangle\right]$

$$= 4\mathrm{Re}\Big[\langle\psi| U^{+}(\theta_0+\pi, \theta_1)\, U(\theta_0, \theta_1+\pi)|\psi\rangle - \langle\psi| U^{+}(\theta_0+\pi, \theta_1)\, U(\theta_0, \theta_1)|\psi\rangle \langle\psi| U^{+}(\theta_0, \theta_1)\, U(\theta_0, \theta_1+\pi)|\psi\rangle\Big]$$

$$= 4\mathrm{Re}\Big[\langle\psi| \cancel{e^{i\frac{\theta_1}{2}\sigma_z}}\, \cancel{e^{i\frac{\theta_0}{2}\sigma_x}}\, e^{i\frac{\pi}{2}\sigma_x}\, \cancel{e^{-i\frac{\theta_0}{2}\sigma_x}}\, \cancel{e^{-i\frac{\theta_1}{2}\sigma_z}}\, e^{-i\frac{\pi}{2}\sigma_z}|\psi\rangle$$

$$- \langle\psi| \cancel{e^{i\frac{\theta_0}{2}\sigma_x}}\, \cancel{e^{i\frac{\theta_1}{2}\sigma_z}}\, e^{i\frac{\pi}{2}\sigma_x}\, \cancel{e^{-i\frac{\theta_0}{2}\sigma_x}}\, \cancel{e^{-i\frac{\theta_1}{2}\sigma_z}}|\psi\rangle.$$

$$\langle\psi| \cancel{e^{i\frac{\theta_0}{2}\sigma_x}}\, e^{i\frac{\theta_1}{2}\sigma_z}\, \cancel{e^{i\frac{\theta_1}{2}\sigma_z}}\, \cancel{e^{-i\frac{\pi}{2}\sigma_z}}\, \cancel{e^{-i\frac{\theta_0}{2}\sigma_x}}|\psi\rangle\Big]$$

$$= 4\mathrm{Re}\Big[\langle\psi| \cancel{(i)}\sigma_x \cancel{(-i)}\sigma_z|\psi\rangle - \langle\psi|(i)\sigma_x|\psi\rangle . \langle\psi|(-i)\sigma_z|\psi\rangle\Big]$$

$$= 4\mathrm{Re}\Big[\langle\psi|\sigma_x \sigma_z \frac{1}{\sqrt{2}}(|0\rangle + |1\rangle) - i\underbrace{\langle\psi|\sigma_x|\psi\rangle}_{=1} . \underbrace{\langle\psi|\sigma_z|\psi\rangle}_{0}(-i)\Big]$$

$$= 4\mathrm{Re}\Big[\langle\psi|\sigma_x . \frac{1}{\sqrt{2}}(|0\rangle - |1\rangle)\Big]$$

$$= 4\Big[\frac{1}{2}.(\langle 0| + \langle 1|)(|1\rangle - |0\rangle)\Big]$$

$$= 4\Big[\frac{1}{2}(0)\Big]$$

$$= 0$$

Similarly: $F_{10} = 0$