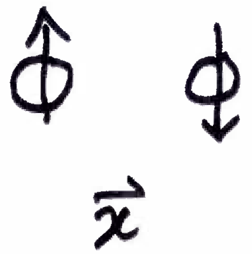
Spin measurement



Antisymm. ; fermions

↓ evolve in time

Earth Moon

Non-local "correlations"/"entanglement"

"collapse" of "wavefunction"

"Independent particles"

→ get "entangled"

But the actual thing independent is the (linear) vector representing the <u>state</u> of the system

.... Use of single particle states

$$|2\,\text{particle}\rangle = |1\,\text{particle}\rangle \otimes |1\,\text{particle}\rangle$$

convenient but misleading

cross-product state ....

... correct quantum numbers
(charge, energy ... additive)

.... not valid physically till you
symmetrise or antisymmetrise.

"collapse" $\longrightarrow$ Schrödinger cat

General excited state

$$|\psi_t\rangle = \sum_n e^{-iE_nt/\hbar} c_n |E_n\rangle$$

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Path Integral formulation

Heisenberg & Schrödinger pictures rely on canonical formulation in the classical limit.

Path Int. is one more ... provides conceptual insight.

Feynman's postulate:

First observe:

$t_f > t_i$

$$A(x_f t_f ; x_i t_i)$$

$$= \sum_{x_1} A(x_f t_f ; x_1 t_1) A(x_1 t_1 ; x_i t_i)$$

$t_f > t_1 > t_i$

But

$$P(x_f t_f ; x_i t_i) \neq \sum_{x_1} P(x_f t_f ; x_1 t_1) P(x_1 t_1 ; x_i t_i)$$

Feynman's Postulate

$$A(x_f t_f ; x_i t_i) = \sum_{\text{paths } x(t)} e^{iS[x(t)]/\hbar}$$

where in detail,

$$S[x(t)] \equiv S[x(t); x_f t_f , x_i t_i]$$

$$= \int_{x_i t_i}^{x_f t_f} dt \, L(x, \dot{x}, t)$$

more accurately (general validity)

$$= \int_{x_i t_i}^{x_f t_f} dt \, (p\dot{x} - H(p, x))$$

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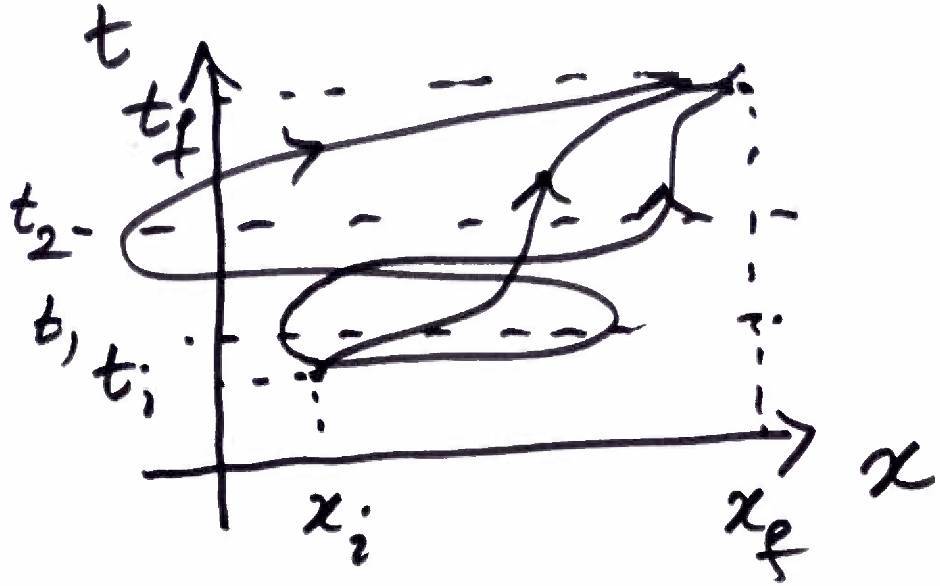
t
t_f
t_2
t_1
t_i
x
x_i
x_f