Lecture 10

QFT Continued...

Summary From Last Time

Time evolution
QM - time plays very fundamental role.

|ψ_out⟩

Different observers, different space-like
see different sheets

|ψ_in⟩
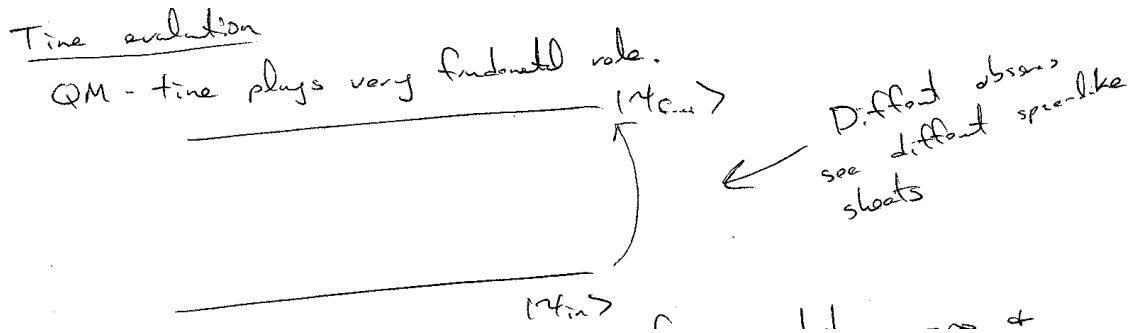
Only have a hope of Lorentz invariance if we start at -∞ and go to +∞.

Throw particles in from ∞ let them scatter & go back out to ∞.

Define S-Matrix

$$\underbrace{|p_1\sigma_1,...p_n\sigma_n\rangle}_{t=-\infty} \rightarrow \underbrace{\mathcal{S}|p_1\sigma_1,...p_n\sigma_n\rangle}_{t=+\infty}$$

$\mathcal{S}$ might be (at least a hope) Lorentz Invariant.

  Massive:

   $|P,\sigma\rangle$ and $U[\Lambda]|P,\sigma\rangle = \sum_{\sigma'} R_{\sigma,\sigma'}|\Lambda P,\sigma'\rangle$, where the R is a rotation matrix.

  Mass-less:

   $|P,h\rangle$ and $U[\Lambda]|P,h\rangle = e^{ih\Theta(W)}|\Lambda P,h\rangle$, where the coefficient is just a phase.

Now talk about all these particles states in a more convenient way.