

ANNOUNCE

- > long HW1 ... due THU? (next wk)
- > TA office hrs → MON?

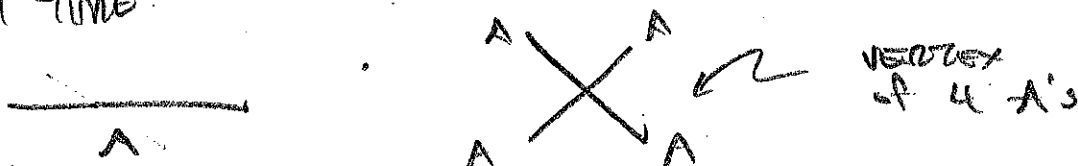
KINEMATICS

$$p^\mu \text{ conserved}$$

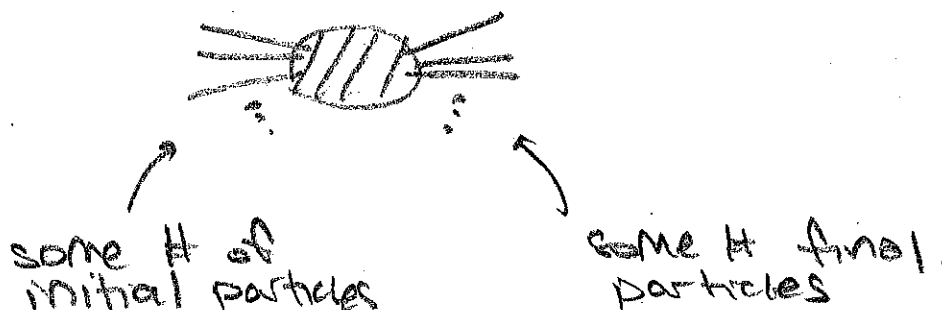
$$p^2 = p^\mu p_\mu = m^2 \quad \text{"on shell"}$$

DYNAMICS : FETTERMAN RULE GAME

LAST TIME:



GAME: GIVEN EXTERNAL STATES



- USE RULES to connect them
- only topology matters
- can use as many lines & vertices (can rotate, move, etc) → make pretty later
- totally connected (will see why later)
- vertical ordering of EXT states stays the same

egs $A \rightarrow 3A$
 $2A \rightarrow 4A$

Q: HOW MANY DIAGRAMS?

$\hookrightarrow \infty!$ PREFER POWER VERLICES.

RULE: draw all lowest ORDER diagrams

\uparrow # vertices

all diagrams that
are ~~too~~ distinct.

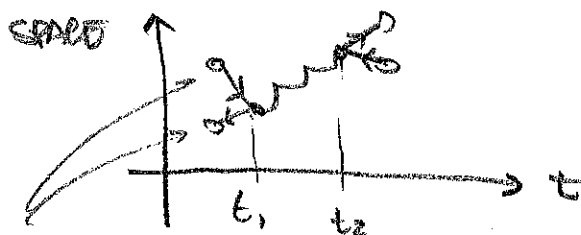
TRY: $A \rightarrow 2A$
 $2A \rightarrow 5A$
 $3A \rightarrow 10A$
 $4A \rightarrow 50A$

} possible? if not, WHY?
 \Rightarrow conservation law

MEANING: ② spacetime diagrams
 \hookrightarrow D PROB. AMPLITUDES

Review N
slit

SPACETIME DIAGRAM



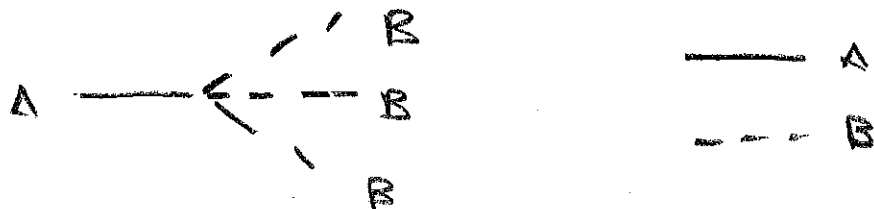
fix
ext lines
 \rightarrow (observer)

we only consider distinct
topologies

\rightarrow corresp. to summing
over all internal
vertex positions

So A GIVEN DIAGRAM
IS A SUM OVER UNSEEN
HISTORIES

4th B : 2 types of PARTICLES



eg: $2B \rightarrow 4B?$

$2A \rightarrow 4B?$

$AA \rightarrow BB?$

$A \rightarrow B?$

loops

conversion?!

RED → MEANING of ARROW
→ int/ext.

| SPECIFY MASSES

DIAGRAMS

$\bar{e}e \rightarrow \gamma\gamma$ 3 IDENTICAL DIAG.

$e\bar{e} \rightarrow N\gamma$

$e\gamma \rightarrow e\gamma$

$e\bar{e} \rightarrow e\bar{e}$

$e\bar{e} \rightarrow e\bar{e}$

KINEMATICS

RULE: ALL EXT STATES ON SHELL

RULE: 4 MOMENTUM CONSERVED @ EA VERTEX

nb: INTERNAL PARTICLES ARE off-shell