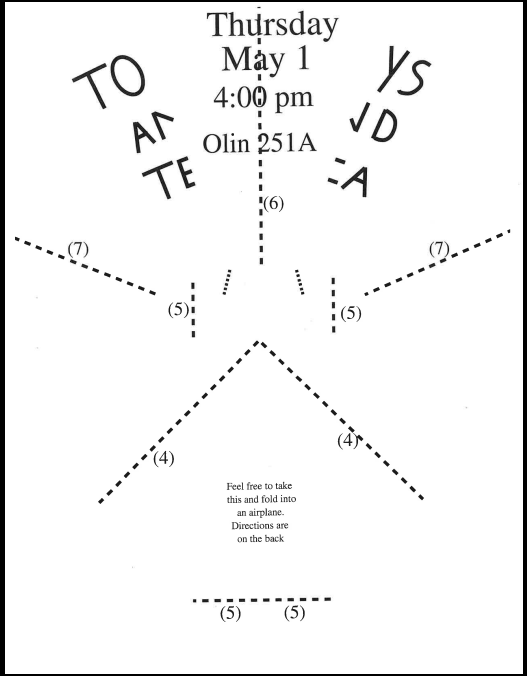
Physics & Astronomy presents:

Arjun Anand '25

"The Notion of Truth in Mathematical Logic"

Thursday May 1
Noon in OLIN 268

Pizza will be served please bring your own water bottle


Thursday
May 1
4:00 pm
Olin 251A
(6)
(7)
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(5)
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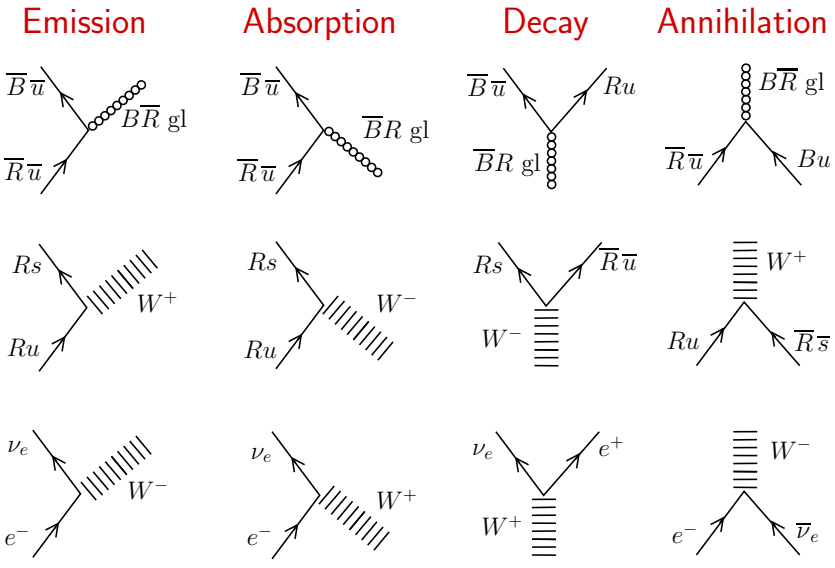
(4)
(4)
Feel free to take
this and fold into
an airplane.
Directions are
on the back
(5)
(5)

Review of Vertex Diagrams



Interaction Diagrams

1. Convert all hadrons to quarks. Leave leptons as they are.
2. Write reactants at the bottom and products at the top.
   - Line up quarks from top to bottom as much as possible.
   - Put particle pairs being created or destroyed next to each other.
3. For hadron-only reactions, check the net quark type. Is there a change?
   - If yes, then weak force, with W^+, W^-, or Z^0 as messenger.
   - If no, then gluons (strong force) or photons (EM) as messenger.
4. Identify quarks that do not interact and connect them with lines from bottom to top.
5. Put in interactions and label colors where appropriate.

Lecture 24 — Concept Test 1

What are the quark constituents of the K^+ particle? Select as many answers as are necessary.

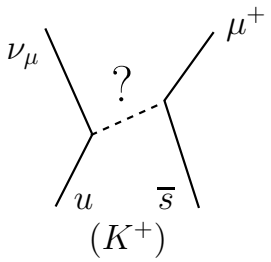
1. u
2. d
3. s
4. $\overline{u}$
5. $\overline{d}$
6. $\overline{s}$

Lecture 24 — Concept Test 2

A kaon decays via the process

$$K^+ \to \mu^+ + \nu_\mu.$$

Let's try an interaction where one of the reactants emits a messenger that is absorbed by the other. What would be the messenger particle?



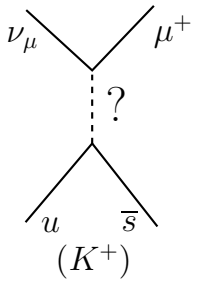
1. a photon
2. a W^+
3. a Z^0
4. a gluon
5. a W^-
6. none of the above

Lecture 24 — Concept Test 3

A kaon decays via the process

$$K^+ \to \mu^+ + \nu_\mu.$$

Let's try an interaction where one of the reactants emits a messenger that is absorbed by the other. What would be the messenger particle?



1. a photon
2. a W^+
3. a Z^0
4. a gluon
5. a W^-
6. none of the above

Lecture 24 — Concept Test 4

Which of the following decays has the shortest lifetime?

1. $\Sigma^-(sdd) \to n(udd) + \pi^-(\overline{u}d)$
2. $\Sigma^0(sud) \to \Lambda(sud) + \gamma$
3. $\Sigma^{*+}(suu) \to \Lambda(sud) + \pi^+(\overline{d}u)$
4. $\pi^+(\overline{d}u) \to \mu^+ + \nu_\mu$

Lecture 24 — Concept Test 5

Which of the following decays has the longest lifetime?

1. $\Sigma^-(sdd) \to n(udd) + \pi^-(\overline{u}d)$
2. $\Sigma^0(sud) \to \Lambda(sud) + \gamma$
3. $\Sigma^{*+}(suu) \to \Lambda(sud) + \pi^+(\overline{d}u)$
4. $\pi^+(\overline{d}u) \to \mu^+ + \nu_\mu$

Grand Unified Theories

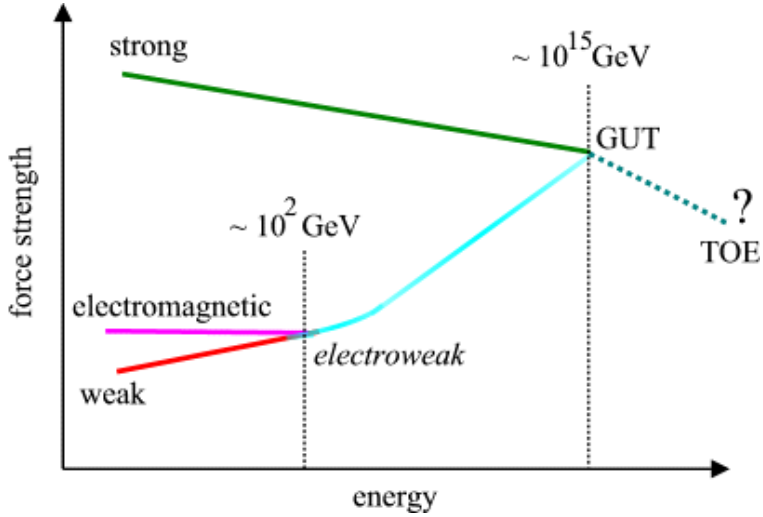


Image from Rory Coker, UT Austin