


Please join
Physics & Astronomy Professors Jackie Villadsen
and D. Iyer along with student researchers Aura
Hernandez '27 and Meshkat Alam '28 to discuss:

The title is centered and surrounded by several yellow starburst graphics of varying sizes and orientations, some with small white dots in their centers.

COLONIALISM IN MODERN ASTRONOMY RESEARCH

Physics and astronomy have historically supported colonization (navigation, war, mining) and an ethos of the supremacy of western "civilization." In this project, we explore the modern ways in which astronomy benefits from and perpetuates its colonial past. This includes building telescopes on sacred indigenous lands, despite systematic opposition from indigenous groups. As we discuss these connections, we reflect on our own values and what we have learned.

Thursday April 30th at noon in OLIN 268

Pizza will be served



Science on Screen

An initiative of the COOLIDGE CORNER THEATRE with major support from the ALFRED P. SLOAN FOUNDATION

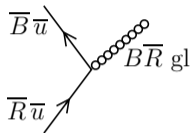
Saturday, MAY 2ND at 7:00 PM

“Unseen and Underestimated:
The Intersection of Race, Gender,
and Identity in STEM” with special
guests **JiaJia Dong & Adam Mair**

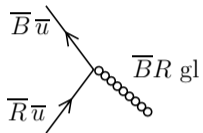


Review of Vertex Diagrams

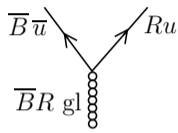
Emission



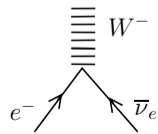
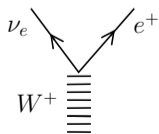
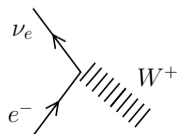
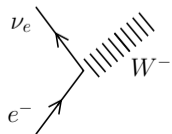
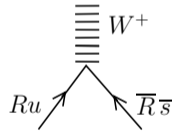
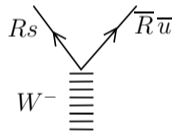
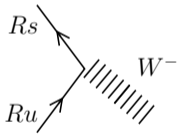
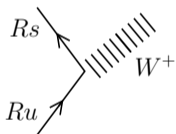
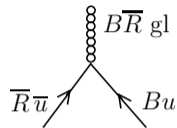
Absorption



Decay



Annihilation



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. \bar{u}

5. \bar{d}

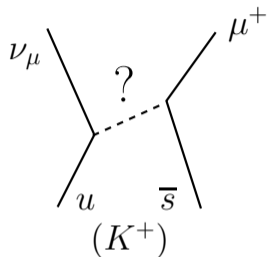
6. \bar{s}

Lecture 24 — Concept Test 2

A kaon decays via the process

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

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?



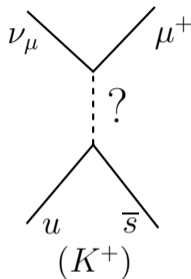
1. a photon
2. a W^+
3. a Z^0
4. a gluon
5. a W^-
6. none of the above

Lecture 24 — Concept Test 3

A kaon decays via the process

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

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

Lecture 24 — Concept Test 5

Which of the following decays has the longest lifetime?

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

Grand Unified Theories

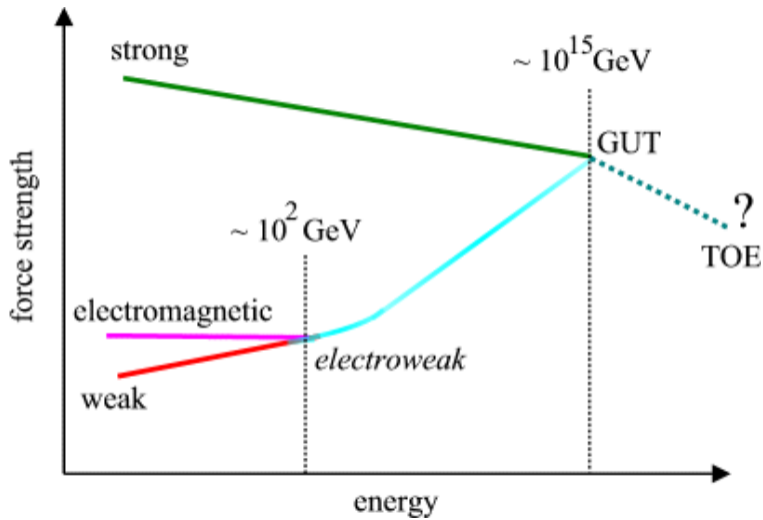


Image from Rory Coker, UT Austin