

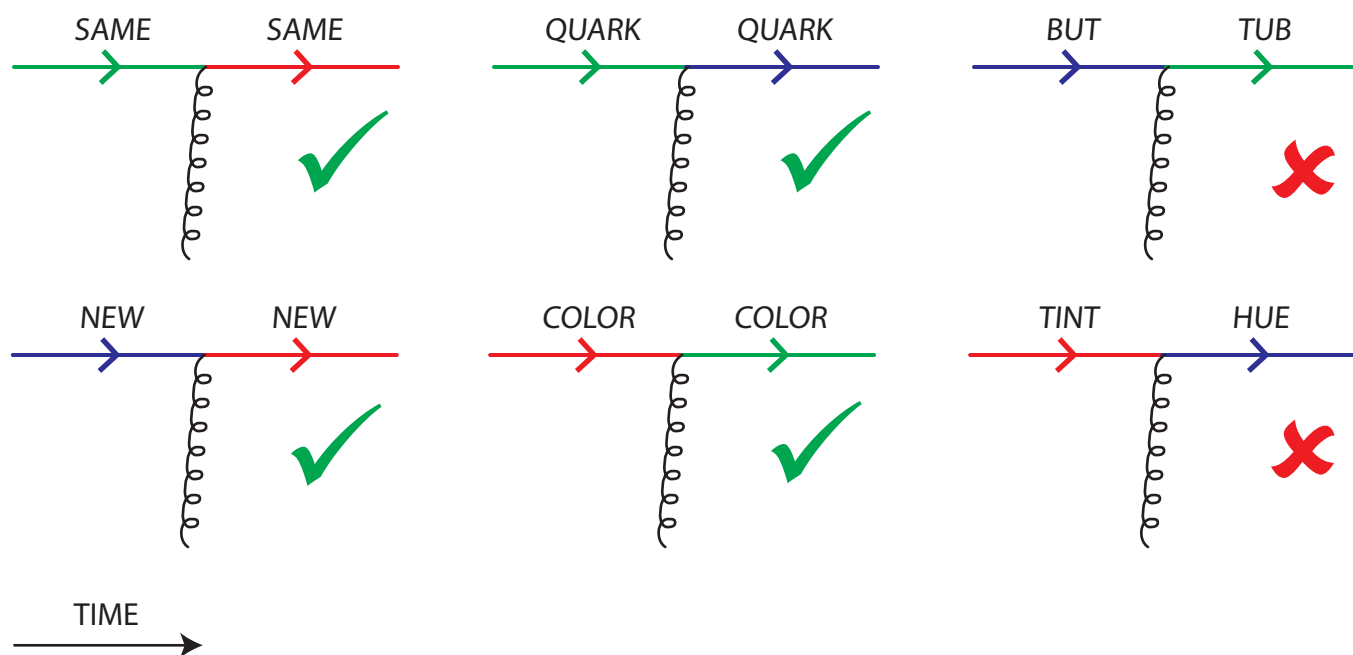
LECTURE NOTES AND EXAMPLES

1. **QUARKS** come in different colors: red, blue and green. Each color behaves a little differently: one color quark **feels** different, one **sounds** different, and one **counts** different.

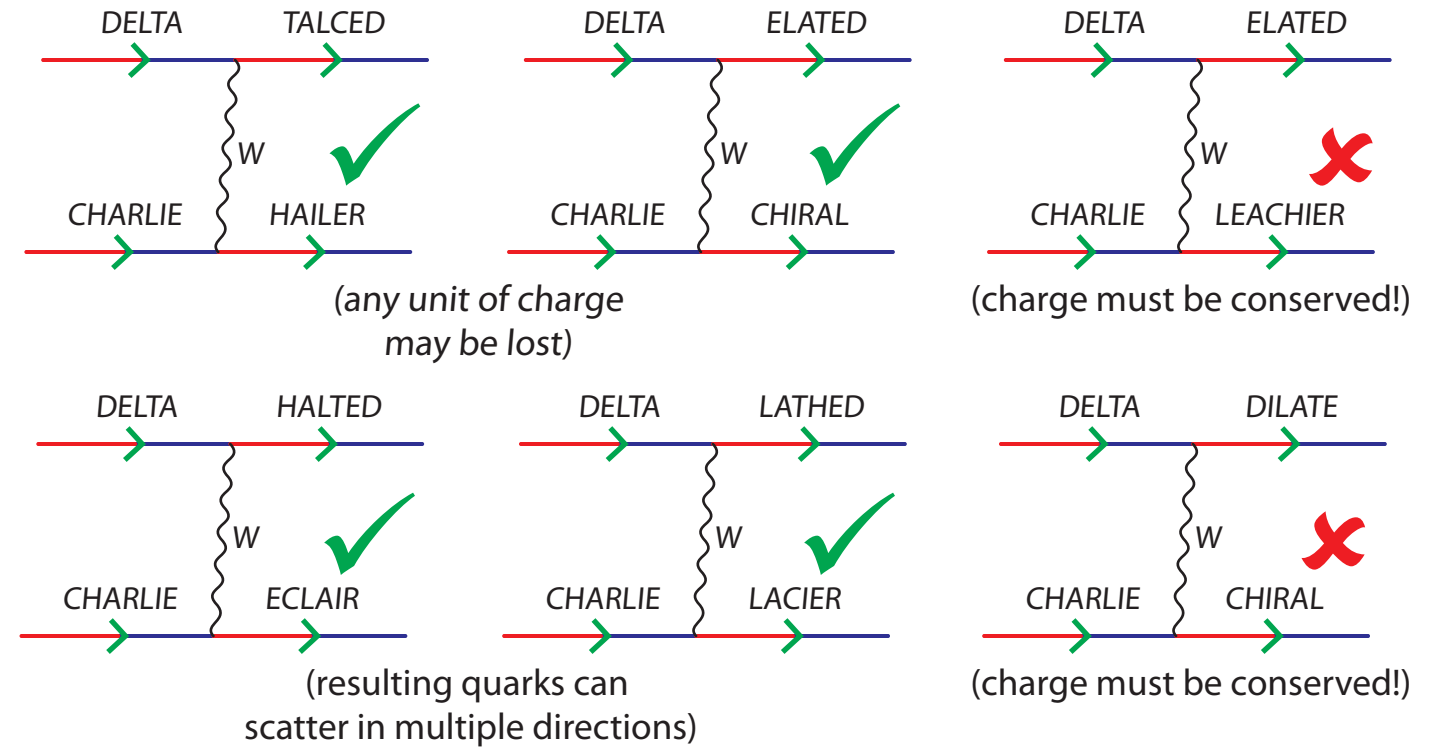
2. **ANTIQUARKS** have opposite charge and inverse chirality from their paired quarks. A quark can sometimes be its own antiquark.

QUARK (q)	ANTIQUARK (\bar{q})
BOOK	POOR
GLOB	CLOP
FLOOD	FLOOD
AUTO	AWES
EMIT	TIME
CANCAN	CANCAN
AMYL	OILY
WOOF	BAAS
FORK	SAVE
ANTIQUARK (\bar{q})	QUARK (q)

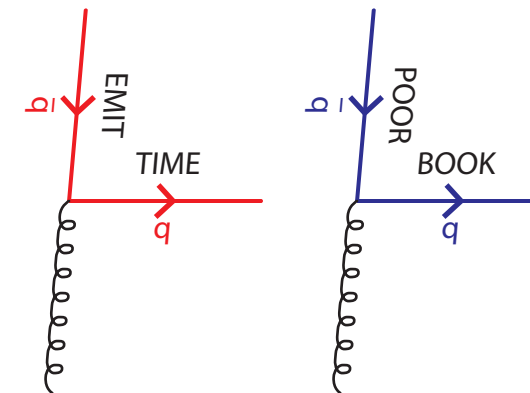
3. **GLUONS** are easy. They only change quark color.



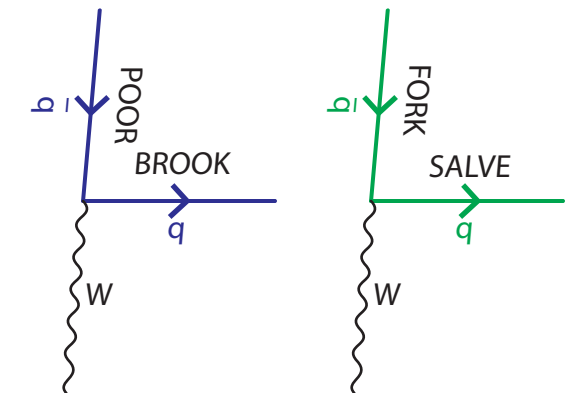
4. **W BOSONS** transfer a unit of charge, and may scatter the quark. W bosons don't care about quark color.



Occasionally a quark / antiquark pair is formed from gluon decay:

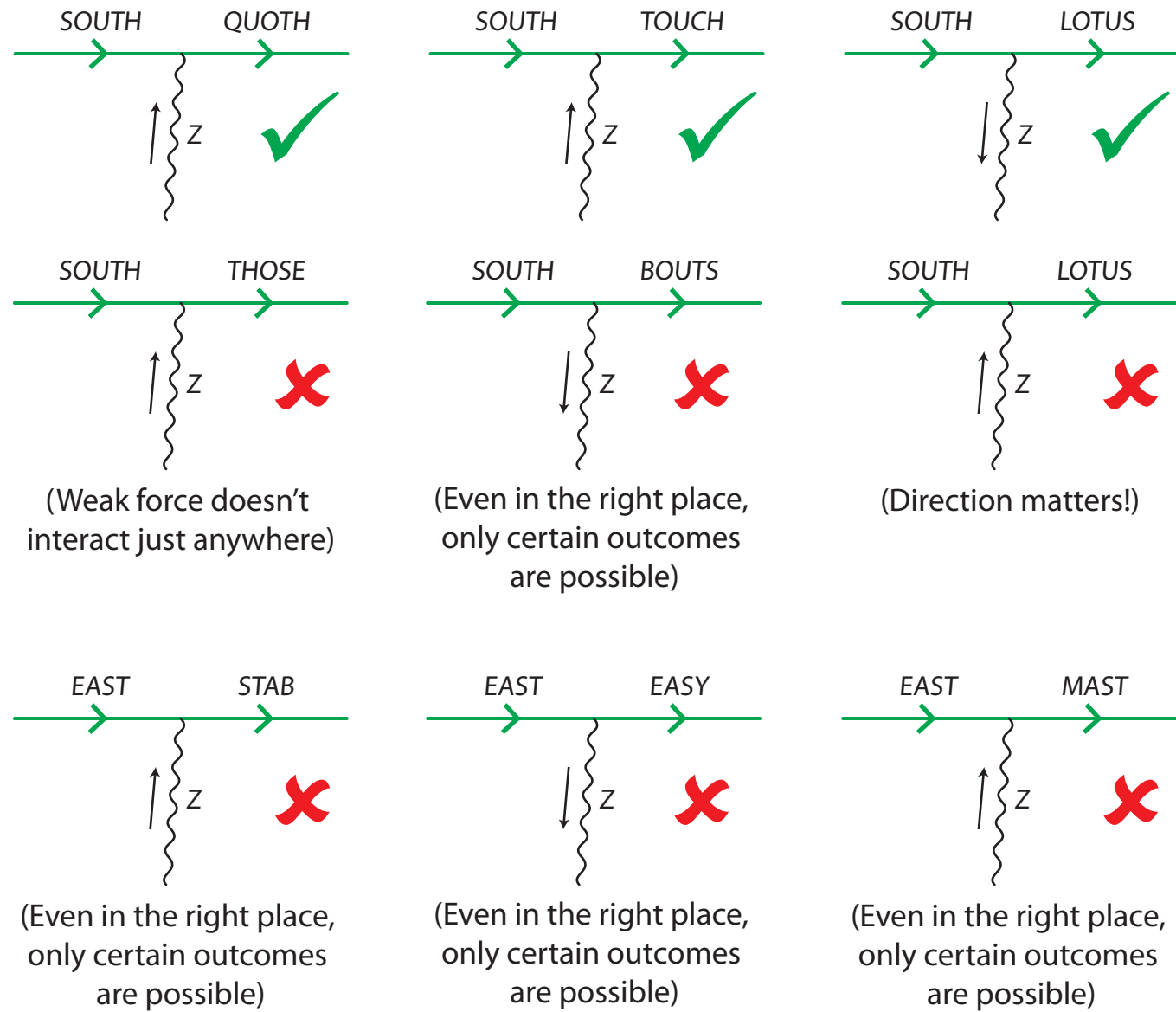


A W boson can also decay to a quark and an antiquark:

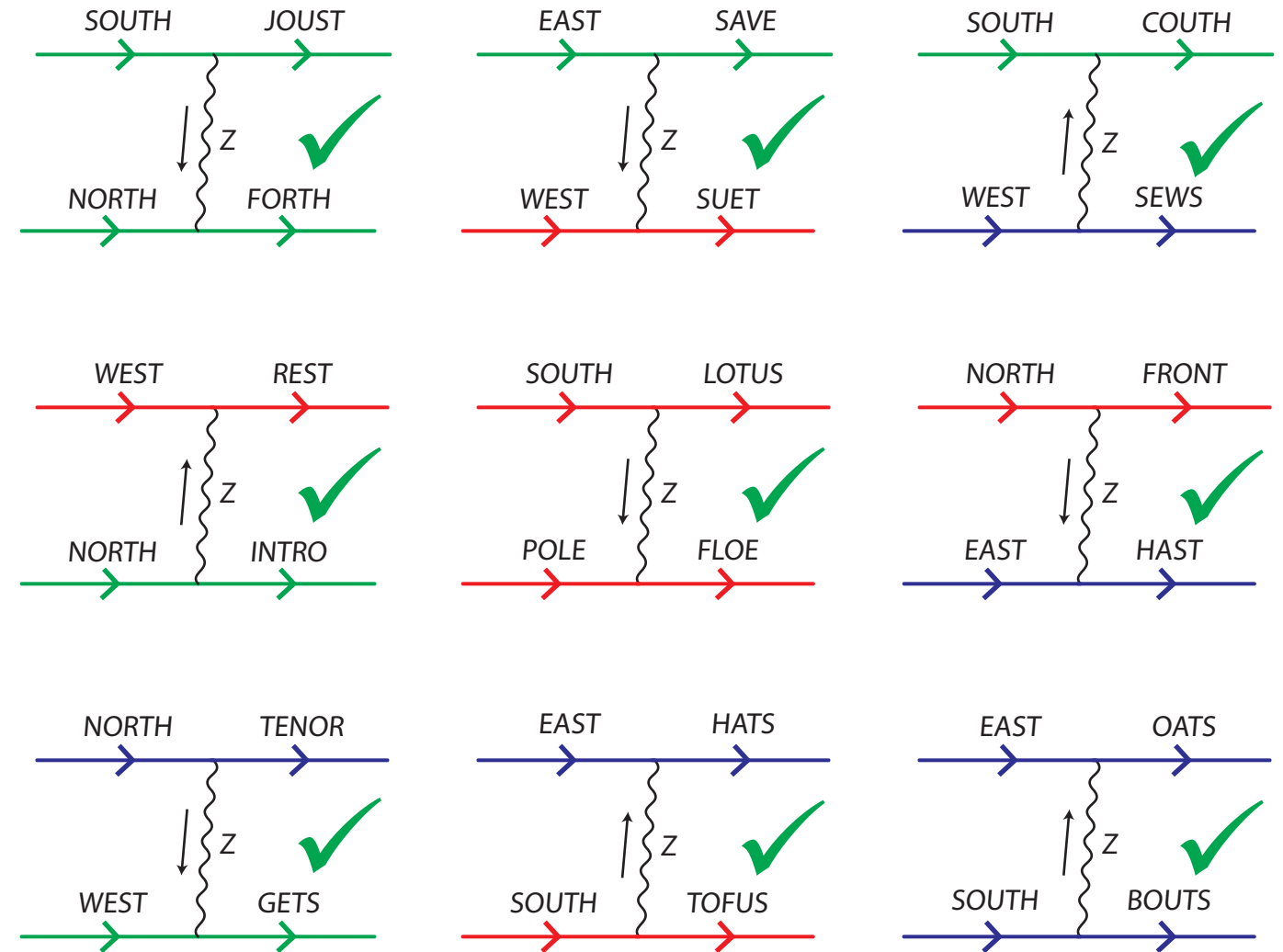


When this happens there is no scattering.

5. Z BOSONS mediate weak force interaction, but only certain outcomes are possible. They also may scatter the quark like W bosons.



The Z boson acts on different colors of quark similarly but with different results. Z bosons can interact with multiple colors simultaneously.



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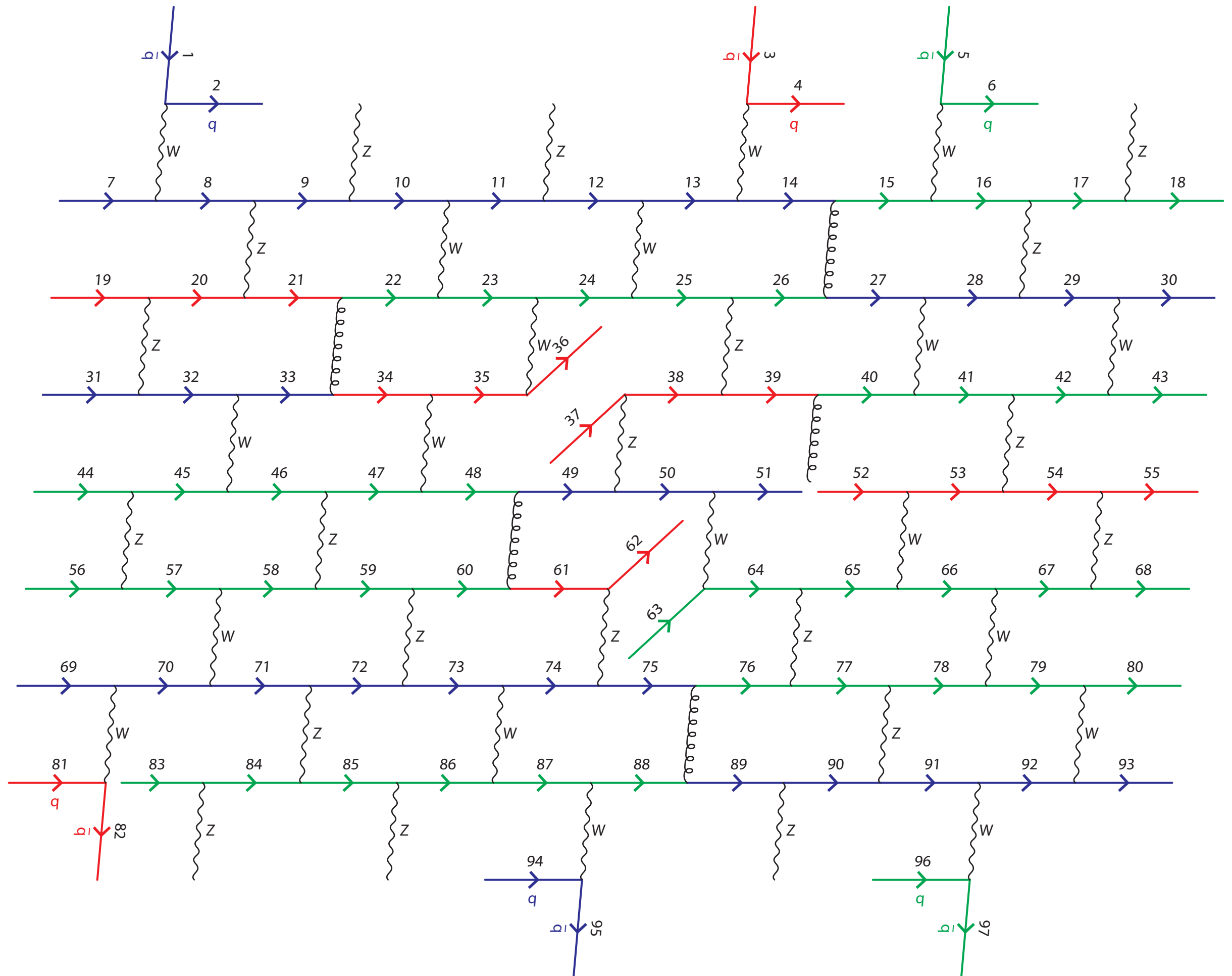
TAKE-HOME FINAL:

Complete the diagram.

Note 1: Some quarks in the diagram will appear to be scattering in more than one direction at once. This is normal and does not represent a threat to the space-time continuum.

Note 2: No two quarks are completely identical.

Note 3: The numbers in the diagram are purely to provide an indication of where inputs go on the diagram and are not in any way part of the final exam.



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