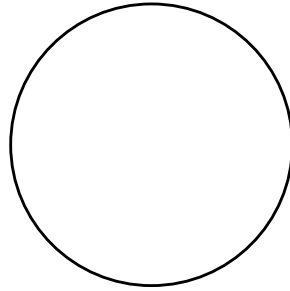


UP QUARK

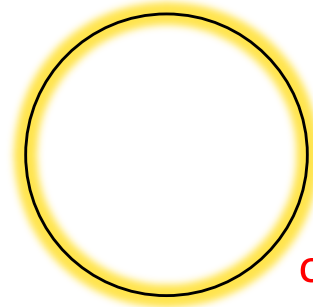
weak charge
(separate of electric charge)



The *weak charge* give rise to the weak nuclear force which causes up quarks and down quarks to swap flavors. Its range is much smaller than the diameter of a proton.

UP QUARK

weak charge
(separate of electric charge)



overlaid is the electric charge
(this generates the
electromagnetic force)

The *weak charge* give rise to the weak nuclear force which causes up quarks and down quarks to swap flavors. Its range is much smaller than the diameter of a proton.

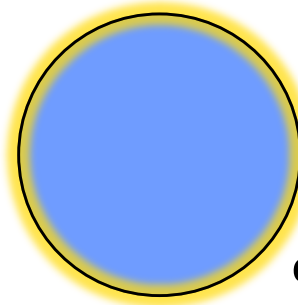
For an UP quark, the *electric charge* is $+2/3$ charge units. This charge is the generator of the electromagnetic force which has infinite range.

UP QUARK

weak charge
(separate of electric charge)

The *weak charge* give rise to the weak nuclear force which causes up quarks and down quarks to swap flavors. Its range is much smaller than the diameter of a proton.

overlaid is the color charge
(this generates the strong force)



overlaid is the electric charge
(this generates the electromagnetic force)

For an UP quark, the *strong force* is 100 times stronger than the e/m force, but its range is only the limited to the size of a proton. It holds together quarks and, by extension, protons and neutrons.

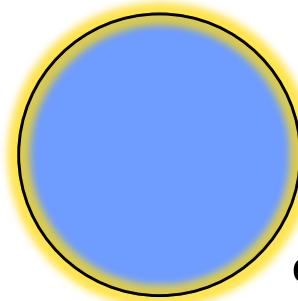
For an UP quark, the *electric charge* is +2/3 charge units. This charge is the generator of the electromagnetic force which has infinite range.

DOWN QUARK

weak charge
(separate of electric charge)

The *weak charge* give rise to the weak nuclear force which causes up quarks and down quarks to swap flavors. Its range is much smaller than the diameter of a proton.

overlaid is the color charge
(this generates the strong force)



overlaid is the electric charge
(this generates the electromagnetic force)

For an DOWN quark, the *strong force* is 100 times stronger than the e/m force, but its range is only the limited to the size of a proton. It holds together quarks and, by extension, protons and neutrons.

For an DOWN quark, the *electric charge* is $-1/3$ charge units. This charge is the generator of the electromagnetic force which has infinite range.