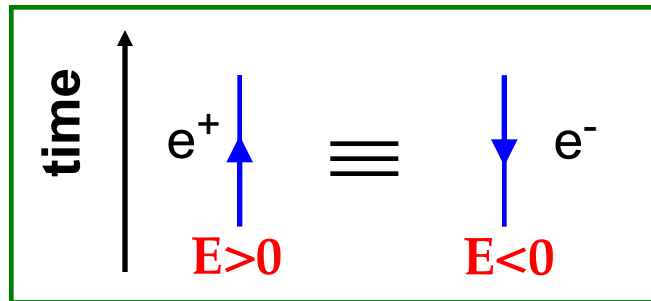


Feynman-Stückelberg Interpretation

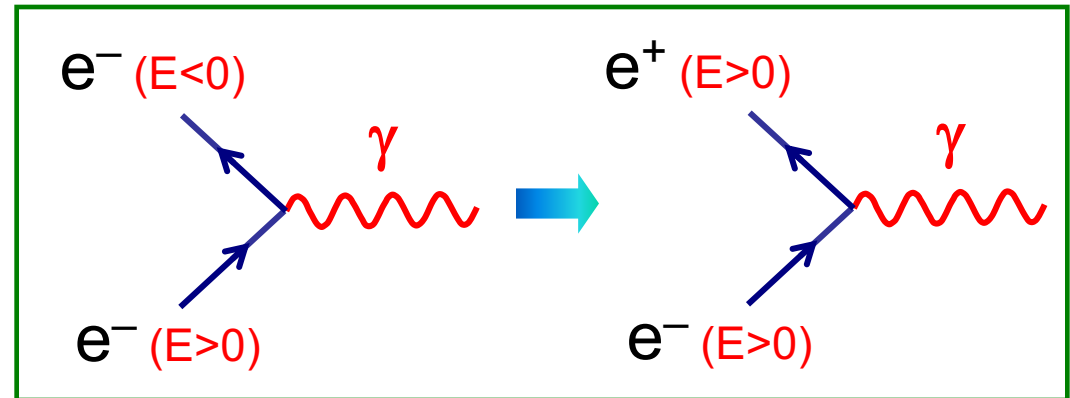
- ★ There are many problems with the Dirac interpretation of anti-particles and it is best viewed as of historical interest – don't take it too seriously.

Feynman-Stückelberg Interpretation:

- ★ Interpret a negative energy solution as **a negative energy particle** which propagates **backwards in time** or equivalently a positive energy **anti-particle** which propagates **forwards in time**



$$e^{-i(-E)(-t)} \rightarrow e^{-iEt}$$



NOTE: in the Feynman diagram the arrow on the anti-particle remains in the backwards in time direction to label it an anti-particle solution.

- ★ At this point it become more convenient to work with anti-particle wave-functions with $E = \sqrt{|\vec{p}|^2 + m^2}$ motivated by this interpretation