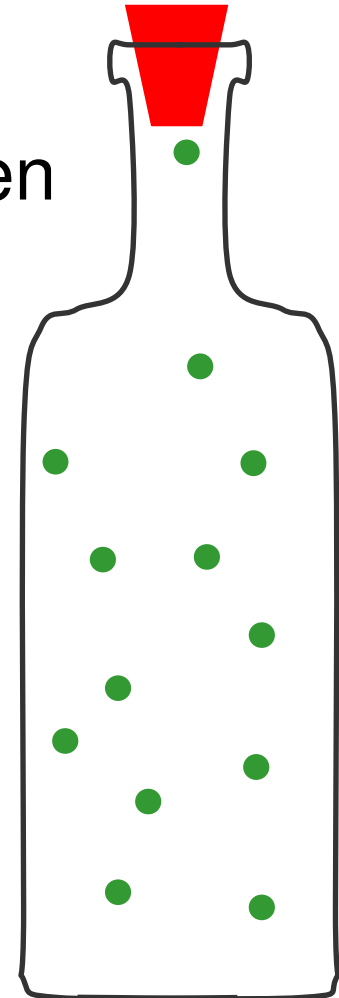


# Ultracold Neutrons (UCN)

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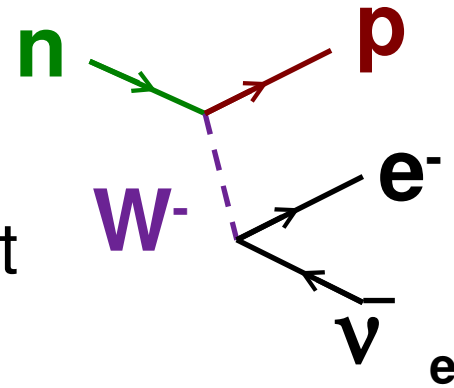
- When neutrons are cold enough ( $v < 30$  km/h), they bounce off walls!
- You can use this to store them in material, magnetic, and gravitational bottles and then study their fundamental properties.
- Canada/Japan group is proposing a new UCN source to be built at TRIUMF by 2012.



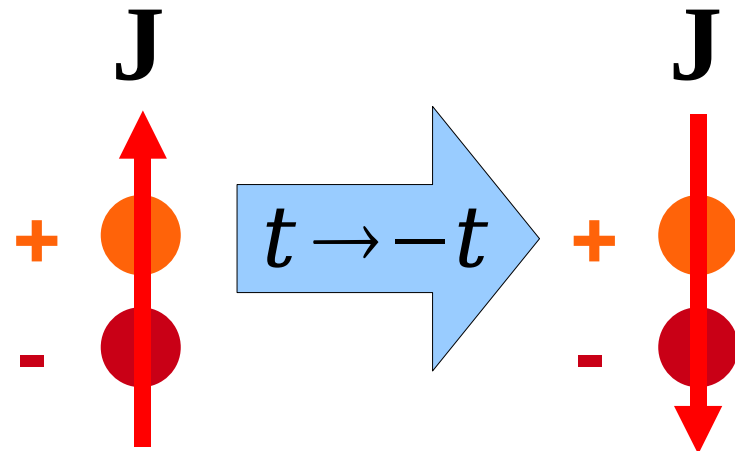
# UCN Physics at TRIUMF

- Neutrons and their interactions are a hot topic in physics.

- How fast do neutrons decay? (BBN)
- Details about how neutrons decay tell us about the weak nuclear force. ( $V_{ud}$ )

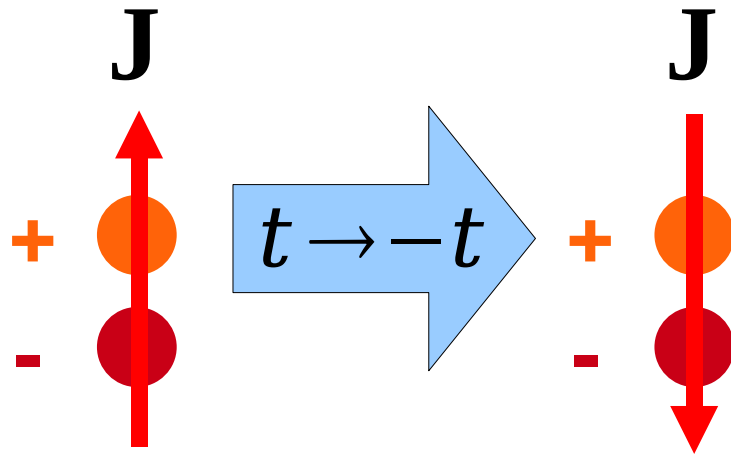


- Does the neutron possess an electric dipole moment? The predominance of matter over antimatter in the universe.



- Interactions of neutrons with gravity and are there extra dimensions?

# Neutron Electric Dipole Moment (n-EDM, $d_n$ )



$$d_n \Rightarrow \cancel{T} \Rightarrow \cancel{CP}$$

New sources of CP violation are required to explain the baryon asymmetry of the universe.

Main advantage of Canada for neutron EDM:

- world-record UCN density achievable at TRIUMF

