

Measurement of J/ψ and ψ' at SeaQuest Experiment

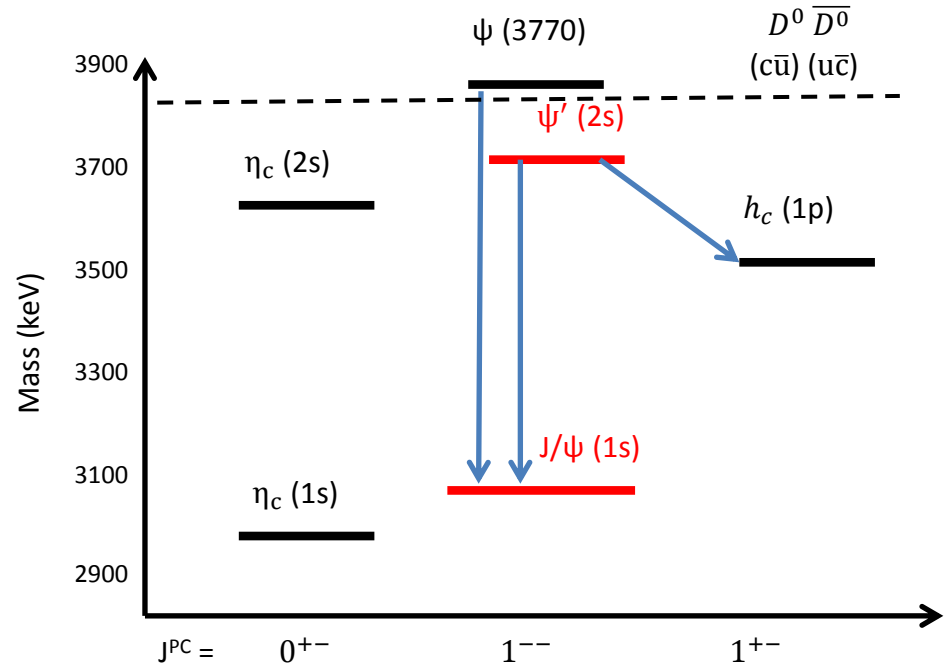
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J/ ψ and ψ' Particles

- J/ψ and ψ' are **charmonium** states (bound state of charm quark c and anti-charm quark \bar{c})
- J/ψ is the lowest energy state of a $J^{PC} = 1^{--}$, $l = 0$ charmonium
- ψ' is an excited state of J/ψ

Discovery of J/ψ

- J/ψ was discovered at the same time in 1974 by two different groups at Brookhaven National Laboratory and SLAC independently.
- BNL group named it J while SLAC group named it $\psi \Rightarrow$ it is now called J/ψ

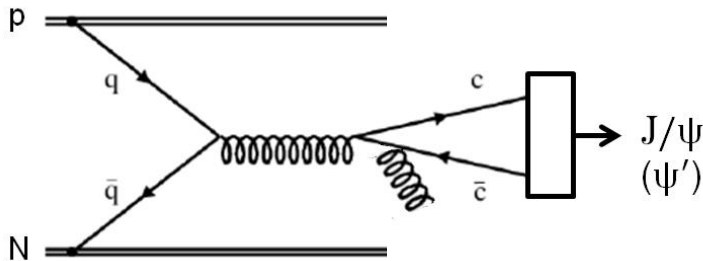


J/ ψ and ψ' at SeaQuest Experiment

- The SeaQuest Experiment is a fixed target experiment using Fermilab's 120 GeV proton beam. Its aim is to explore the quark – gluon structure of nucleons.
- At SeaQuest Experiment, J/ ψ and ψ' are produced as follows:

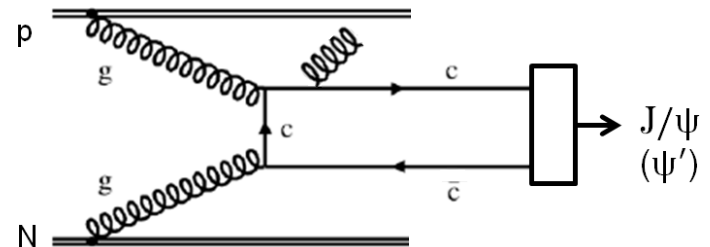
1. Quark – Anti-quark Annihilation

$$q + \bar{q} \rightarrow g \rightarrow c + \bar{c} \rightarrow J/\psi (\psi')$$



2. Gluon – Gluon Fusion

$$g + g \rightarrow c + \bar{c} \rightarrow J/\psi (\psi')$$



In the poster, I will show the **method and physics purpose** for the measurement of J/ ψ and ψ' at SeaQuest Experiment.