

PHYS 3446 – Lecture #5

Monday, Sept. 18, 2006

Dr. **Jae** Yu

1. Nuclear Phenomenology
2. Properties of Nuclei
 - Labeling
 - Masses
 - Sizes
 - Nuclear Spin and Dipole Moment
 - Stability and Instability of Nuclei
3. Nature of the Nuclear Force



Announcements

- We will have a private lecture from Dr. H. Weerts this Wednesday
 - Current director of HEP division of Argonne National Accelerator Laboratory
 - Current member of HEPAP-P5 advisory panel
 - Former spokesperson of the DØ experiment
 - Expert in strong interactions
- Sorry, I still don't have e-mail from three of you
 - Please come by my office after the class to add you on the list
- Workshop on Sept. 30
 - 10am – 5pm, CPB303 and HEP experimental areas
 - Food and refreshments
- Quiz in the class next Monday
- First term exam on Wednesday, Oct. 4.



Nuclear Phenomenology

- What did Rutherford scattering experiment do?
 - Demonstrated the existence of a positively charged central core in an atom
 - The formula did not quite work for high energy α particles ($E > 25 \text{ MeV}$), especially for low Z target nuclei.
- In 1920's, James Chadwick found
 - Serious discrepancies between Coulomb scattering expectation and the elastic scattering of α particle on He.
 - None of the known effects, including quantum effect, described the discrepancy.
- Clear indication of something more than Coulomb force involved in the interactions
- Chadwick's discovery neutron in 1932 \rightarrow Nuclei consist of nucleons, protons and neutrons