

INPP NUCLEAR LUNCH SERIES

April 19, 2017

Questions are based on

Observation of π^-K^+ and π^+K^- atoms

(B. Adeva *et al.*)

1. How does the radius of electron's orbit (say in a hydrogen atom) compare to that of pion/Kaon in an $A_{\pi K}$ atom? **(Doug)**
2. What are the properties of mesonic atoms? How do the decay lifetimes of mesonic atoms place constraints on the low-energy quark scattering, which cannot be calculated directly? **(Sudhanva)**
3. The paper finds that the production of π^-K^+ is highly likely (see Table I) compared to π^+K^- . What could be a possible reason? **(Mongi)**
4. What are the differences between atomic, Coulomb, and non-Coulomb pairs? Can one describe the ratios of atomic to Coulomb or Coulomb to non-Coulomb pairs produced? **(Matt)**
5. Why is there a peak at $Q = 4$ MeV/ c in Figure 5 (top)? Why is the data point at 8 MeV so low (Figure 5)? **(Tyler)**
6. What are the length scales of the DIRAC detector? What is the resolution of the timing detectors? What is a hodoscope? How is it different from a drift Chamber? **(Nadyah)**
7. They used Ni and Pt targets. Why? What other targets could have been used? What is the minimum proton beam energy required to create πK atoms? **(Bishnu)**
8. Have they published the lifetime of the current mesonic atom? How do they base their claim that it is a bound system rather than just two neighboring mesons? **(Kristyn)**
9. Why is the time difference ΔT negative in Figure 3? Does it matter which one of the particles is produced first from the pairs? **(Gulakshan)**
10. What other types of experiments have been carried out by the DIRAC collaboration? **(Abinash)**
11. Does this experiment give an idea about tetra- and pentaquark systems? Especially the EM, QCD interactions. **(Mamun)**