

Nuclear Lunch Questions

Search for dark photons from neutral meson decays in p+p and d+Au collisions at $\sqrt{s_{NN}} = 200$ GeV.

Nov. 4 and Nov. 18, 2015.

1. Total matter in universe is stated to be 4.9% real matter, 26.8% dark matter and the rest dark energy. How are these numbers obtained? (Nadyah)
2. To date, is there a specific theory that is leading to explain dark matter? Can you explain the pros and cons of both WIMPs and dark photons? (Andrea)
3. What are axions? (Taya)
4. What density of dark photons in our galaxy would we expect to be associated with the dark matter? (Nick)
5. How can we assume dark photon decays to e^+e^- , instead of decaying to some dark matter (i.e. dark matter version of e^+e^-)?(Tyler)
6. How is the radiation length defined? Why is it relevant here? (Shamim)
7. Paper states that contribution of conversion pairs becomes negligible at invariant mass above 40 MeV/ c^2 , why? (Cody)
8. How do you make a detector “blind” to the hadrons? If the hadron-blind detector adds more low energy background, what was the benefit of adding it to the PHENIX detector? (Sushil)
9. What is a look-elsewhere effect? (Rekam)
10. Why is examining the like-sign pairs thought to be a good method for identifying background? (Arbin)
11. What else can the Kroll-Wada formula be used for? Can you include other mesons (i.e. ω, η', ϕ)? (Linda)
12. Why are Chebyshev polynomials used for fitting the data (Fig. 2)? (Brian)
13. To work out the power of the search they used 90% C.L. at a specific mass, but what about ε ? (Douglas)
14. What is the $g - 2$ experiment? What does $(g - 2)_\mu$ mean? (Mongi)
15. If the dark photon is ruled out as an explanation for the deviation between $(g-2)_\mu$ and the standard-model prediction then what other explanations might there be? (Mamun)
16. Can PHENIX do future dark-photon searches that are better than this one? (Abinash)
17. What is pseudo-rapidity? (Som)
18. What is meant by the Lamb Shift in muonic hydrogen? In fig. 4, it looks like there is a small region, $m_U \sim 30, \varepsilon^2 \sim 2 \times 10^{-6}$, where both BaBar and PHENIX do not rule out dark photon. Have they tried using these parameters in an attempt to explain proton-radius puzzle?