Nuclear Lunch Questions for

Evidence for light-by-light scattering in heavy-ion collisions with the ATLAS detector at the LHC

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Introduction

1. Why is $\gamma\gamma \rightarrow \gamma\gamma$ forbidden in classical electromagnetism? (**Mamun**)
2. What is the equivalent photon approximation? (**Matt**)
3. What is Delbruik scattering? (**Robert**)
4. What is a fiducial cross section? How is it calculated? (**Nadyah**)
5. What is a hard bremsstuhlung photon? (**Utsav**)

Experiment

1. How is the beam luminosity measured/calculated? What is integrated luminosity? Why does it have units of inverse area? (**Som**)
2. What else can ultra-peripheral collisions be used to study? (**Ibrahim**)
3. How are clusters formed in the electromagnetic calorimeter? (**Doug**)
4. What is absolute pseudorapidity? How is it measured? (**Joey**)
5. Why did they use lead nuclei in this collision? (**Gulakshan**)
6. Why are the zero degree calorimeters placed so far away from the collision location at ATLAS? (**Bishnu**)
7. What is the definition of transverse energy? (**Shiv**)

Results

1. What is the limited knowledge of the nuclear electromagnetic form factors that leads to the 20% uncertainty in reference 20? (**Taya**)
2. What causes the fake photon background? (**Abinash**)
3. What is the condition for having light by light scattering? When can light be considered a particle and not a wave and treat this problem as an interference? (**Sudhanva**)
4. What physics insight will we gain by knowing that light by light scattering occurs in UPCs? (**Kristyn**)
5. How large, relative to the photon interaction, is the quark contribution? Does the O(100%) error risk skewing the final measurement significantly? (**Mahesh**)