A small proton charge radius from an electron-proton scattering experiment

January 22, 2020

1. How are muonic Hydrogen made? What are the challenges in making them and doing spectroscopy? Can you make Tauonic Hydrogen and do similar spectroscopy? Are there any other forms of exotic Hydrogen? (Justin)

2. Why is it important to measure $r_p$? What is the physical significance of the fact the proton radius is smaller than previously known when applied to other fields of physics? (Kristyn)

3. Are there any other proposed ways to solve this puzzle (experimental ideas, new theories, etc..) that people are considering? (Matt)

4. How does the HyCal measure the energy of the scattered electrons? Why does the HyCal have the lead glass outer section? Wouldn’t it be better to cover the calorimeter with the more precise crystal PbWO$_4$ modules? (Joseph)

5. How to get the position of the scattered electrons from the GEM and HyCal? How do you get the scattering angles? (Gula)

6. What was the lowest $Q^2$ in the Mainz data? Why is it difficult to measure at low $Q^2$? What improvements have been made to go lower in $Q^2$? (Yenuel)

7. What are the major contributions to the systematic error? Why would systematic uncertainty grow larger for the 2.2 GeV data (blue in Fig. 3a and 3b) than the 1.1 GeV data (red) with increasing $Q^2$? (Jacob)

8. What is Moller Scattering? (Som)

9. Does performing the experiment at different energies affect the analysis or results of the experiment? (Doug)

10. What range in $Q^2$ should we choose to get the best fit and extract the proton radius? How do you choose between the fitting functionals? Why not use normal polynomials? How does the choice of $Q^2$ range depend on your fitting functional? (Mahesh)