

# Measurement of the proton spin structure at long distances

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## Discussion

1. What are the hadronic sum rules discussed in this paper? e.g. Ellis and Jaffe sum rule, GDH sum rule and sum rule to the integral of A1F1 (**Nisha**)
2. What do you mean by polarization of beam and target? How do you polarize them and what value does it bring in the experiment? (**Ibrahim**)
3. They have measured the values of  $\Gamma_1$ , and  $I_{TT}$  in the paper. How are they related in solving the spin problem of the proton? (**Justin Bryan**)
4. What makes Cerenkov detectors useful for distinguishing pions? (**Alexandra**)
5. The paper states that their  $Q^2$  results range down to the pion mass squared, which makes it possible to rigorously test  $\chi$ EFT calculations for spin-dependent observables. Why is that? (**Jacob**)
6. What is a scintillator hodoscope? (It says in the paper its used for time of flight measurements but I'm curious of details) (**Gula**)
7. What are the LEC's (low energy constants) in the chiral effective field theory ( $\chi$ EFT) used in this paper fit to? (**Robert**)
8. Lattice gauge theory is mentioned in the paper as a non-perturbative way to calculate QCD. What is lattice gauge theory and how is it used to do these QCD calculations? (**Shyam**)
9. How does the cross-section amplitude for real photon production compare to the one for virtual photon production in the energy range of the experiment? (**Mahesh**)
10. How is the real photon data (purple square data point in Fig. 5) measured? (**Yenuel**)