

CLAS12 Run Group C:
Jeopardy updated document

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Due to major downtimes of the accelerator and Hall B equipment issues, the Run Group C was only able to run 2/3 of the PAC48-approved days. In this Jeopardy proposal, the RGC requests beam time to finalize the additional missing PAC days, which are critical for the completion of the experiments and for achieving optimal accuracy in the measurements. There are several experiments in the RGC that all require a longitudinally polarized target to access a variety of fundamental quantities in hadron structure, including helicity-dependent PDFs, TMDs, and GPDs, all of which are highlighted in the 2023 NSAC Long Range Plan.

To illustrate the importance of completing these measurements, the new data on DIS and SIDIS will provide access to the longitudinally polarized structure function F_{LL} , which is extremely challenging to measure in the high- x region due to suppression induced by an ϵ -dependent kinematic factor. These measurements will provide a unique opportunity to reconstruct helicity PDFs/TMDs at high x , particularly the d -quark PDF. There is considerable interest in the polarized d -quark PDF, for example, whose possible sign change at high x is still elusive, according to the most recent analysis by the JAM Collaboration, which has recently included W -lepton and jet production data in polarized pp collisions at RHIC, and the available high- x data from Jefferson Lab.

This Run Group is one of the central pillars of the hadron structure component of the 12 GeV program, and it is vital for its successful completion to collect these data with sufficient precision to make the expected impact on our knowledge of the parton structure of the nucleon.