

PAC45: (Updated: 7/17/2017)

Hall B Experiment Run Groups

The PAC approved 1621 days of physics running with CLAS12. Additional 330 days were C1 conditionally approved requiring transverse polarized target operation. In addition, 15 days were approved for a non-CLAS12 experiment, PRad. Another 180 days were C1 conditionally approved for the HPS experiment to make a total of $1621+330+15+180 = 2146$ days.

For optimization of beam operation in Hall B the plan calls for running several experiments as Run Groups (RG) if they share the same beam energy, target material, and other parameters such as magnetic field direction in the Torus magnet. The currently planned RG are labeled **A** through **L**, and are shown in the attached tables for CLAS12 approved experiments, for C1 approved CLAS12 experiment and for non-CLAS12 experiment, respectively. The total run time for all run groups then reduces to 1091 days.

Comments on individual Run Groups:

Run Group A:

Covers experiments E12-06-108/E12-06-108A/E12-06-108B, E12-06-112/E12-06-112A/E12-06-112B, E12-06-119, E12-09-003, E12-11-005/E12-11-005A, E12-12-001, E12-12-001A, and E12-12-007. Note that experiments with character A or B at the end, e.g. E12-11-005A, are CLAS collaboration approved run group proposals, and run together with the corresponding primary experiments, e.g. E12-11-005. **CLAS collaboration approved run group experiments do not require additional beam time.**

All experiments require 11 GeV beam energy, polarized electrons at $P_e > 0.8$, and a liquid hydrogen target. The total run group time of 139 days was determined as follows:

1) High luminosity running of 80 days is needed for 3 experiments (E12-06-108, E12-06-119, E12-11-005, E12-12-001). Experiment E12-11-005 requires lower luminosity operation for 39 days. Experiment E12-12-001 declared that the 80 days plus the 39 days additional low luminosity days are equivalent to the total of 100 days they had requested.

2) E12-12-001 received approval for additional 20 days of running at reversed Torus polarity. The listed RG-A time of 139 days will thus serve all PAC approved experiments with a total of 559 days of individually approved beam times. (This number does not include the run group experiments, which account for additional 420 days if run independently.)

3) Note that E12-11-005 requires an additional trigger that uses charged tracks from the CLAS12 tracking detectors. This trigger system is now under construction.

Note, that all experiments running as a group for the full 139 PAC days will receive extra beam time, potentially increasing physics impact.

Run Group B:

Covers experiments E12-07-104, E12-09-007a, E12-09-008, E12-011-003.

E12-07-104 will use a dual liquid D₂ and liquid H₂ target to measure the magnetic form factor of the neutron. The H₂ target is used for measuring the neutron detection efficiency of the CLAS12 forward calorimeters (EC + PCAL) using the reaction $ep \rightarrow e\pi^+n$ on free protons simultaneously to quasi-elastic $en \rightarrow en$ scattering.

Comments:

1) The dual target cell has not been built yet, but the assumption is that the same target can also be used (and would be useful) for the other experiments in RG-B. Should that impose unacceptable constraints on these experiments E12-07-104 would be run standalone, which will add 30 PAC days to the RG-B schedule, resulting in a total of 120 days.

2) Several experiments require one sector equipped with a RICH detector for kaon identification. The detector is now under construction and is expected to be available in FY 2018.

3) E12-09-007a represents the part of E12-09-007 run with unpolarized target.

Run Group C:

Covers experiments E12-06-109, E12-06-109A, E12-06-119(b), E12-07-107, E12-09-007(b), E12-09-009. E12-06-119(b) and E12-09-007(b) represent the polarized target portions of the experiments E12-06-119 and E12-09-007, respectively.

Comments:

1) All experiments require 11 GeV beam energy, polarized electrons at $P_e > 0.8$, and a longitudinally polarized NH₃ target. All experiments except E12-06-119(b) require also a polarized ND₃ target. The total run group time was determined as follows:

2) The 185 days correspond to the sum of 120 days required by E12-06-119(b) on NH₃ and the 50 days required by E12-06-109 on ND₃. The PAC later added 10 days on ND₃ to E12-09-009 and approved 5 days of running on ¹⁵N target, for a total of 120+50+10+5 = 185 days. All other experiments have either an equal or a fewer number of PAC days requested. RG-C thus serves not only the five experiment with individual running of 486 days, but potentially increases impact of all experiments as they can realize more beam time combined than they requested individually.

3) Several experiments in RG-C require one sector equipped with a RICH detector for charged kaon identification. The detector is now under construction and expected to be available in FY 2018.

Run Group G:

Covers C1 conditionally approved experiments C12-11-111, C12-12-009, C12-12-010, for running with a transversally polarized HD target. While the 3 experiments have different physics goals they can run together at a RG-G beam time of 110 PAC days. If run individually they would require a total of 330 PAC days.

RG-D, RG-E, RG-F, RG-H, RG-I, RG-J:

Represent individual experiments with specialized setups that are currently not suitable for combined running with other experiments.

RG-K:

Covers the experiments E12-16-010, E12-16-010A, E12-16-010B. The 3 experiments require a total of 100 PAC days of beam time, 50 days at 6.6 GeV and 50 days at 8.8 GeV running. Additionally, polarized beam at $P_e > 0.85$ are required for all 3 experiments, and one experiment (E12-16-010) requires a special trigger with electron detection in the Forward Tagger, and one or two hadrons in CLAS12 proper. All 3 experiments will need high luminosity.

RG-L:

Covers the experiments E12-17-012, E12-17-012A, E12-17-012B, and E12-17-012C. The four experiments require a total of 55 PAC days of beam time, 50 days at 11 GeV, and 5 days at 2.2 GeV. The experiments do not require polarized electron beam.