

## MEMORANDUM

Date: March 16, 2021  
To: Distribution  
From: Rolf Ent and Camille Ginsburg for the Nuclear Physics Experiment  
Scheduling Committee  
Subject: Accelerator Schedule through December 2022

### Schedule

Attached is the accelerator operations schedule through December 2022. It has also been posted at [http://www.jlab.org/div\\_dept/physics\\_division/experiments/schedule.html](http://www.jlab.org/div_dept/physics_division/experiments/schedule.html). Access to the database format of the same schedule, as used by the beam accounting system, can be found at <https://cebaf.jlab.org/btm/schedule>.

The operations schedule is based on fiscal 2021 and expected 2022 funding. It may be subject to adjustments due to actual funding, the progress of the ongoing Scheduled Accelerator Down or developments related to the COVID-19 virus.

Since the last schedule update was released August 12, 2020, the remaining six weeks of scheduled FY2020 operations were completed. The lab moved then into a Scheduled Accelerator Down (SAD). High-priority activities programmed for this SAD include replacement of one of the Central Helium Liquefier “cold boxes,” installation of two new accelerating cryomodules and upgrading control systems to extend energy reach, replacement of leaking cryo-control valves and cryomodule seals damaged by radiation and, implementing the first phase of an ongoing injector upgrade required by future experiments. Restore of the experimental program is scheduled to take place August 2021 instead of June, as shown on previous published experiment schedules. The main causes of the delay are the schedule shift in FY2020 operations caused by the COVID-19 pandemic and the SAD work slowdown caused by control measures needed to avoid propagation of the virus like social distancing and need to use specialized personnel protection equipment.

For calendar year 2021, we expect 18 weeks of operations starting mid-August. The schedule has one week of beam restore followed by seventeen weeks of beam operations for experiments. The entire run cycle has been scheduled at lower, non-standard, energies per pass (1.82 GeV/pass and 1.96 GeV/pass) to be able to carry out measurements of longitudinal-transverse pion cross sections in Hall C. The impact on hall multiplicity of lower energy per pass has been reduced by scheduling at the same time other experiments that do not require the highest energy the machine can deliver. Operating at lower energy per pass in 2021 also provides some relief to the gradient recovery program of the lab.

The present schedule has Hall A starting September 2021 with calibrations of the Super Big-byte Spectrometer (SBS) followed by  $G_M^n$  (E12-09-019),  $G_E^n$ -RP (E12-17-004) and wide-angle pion

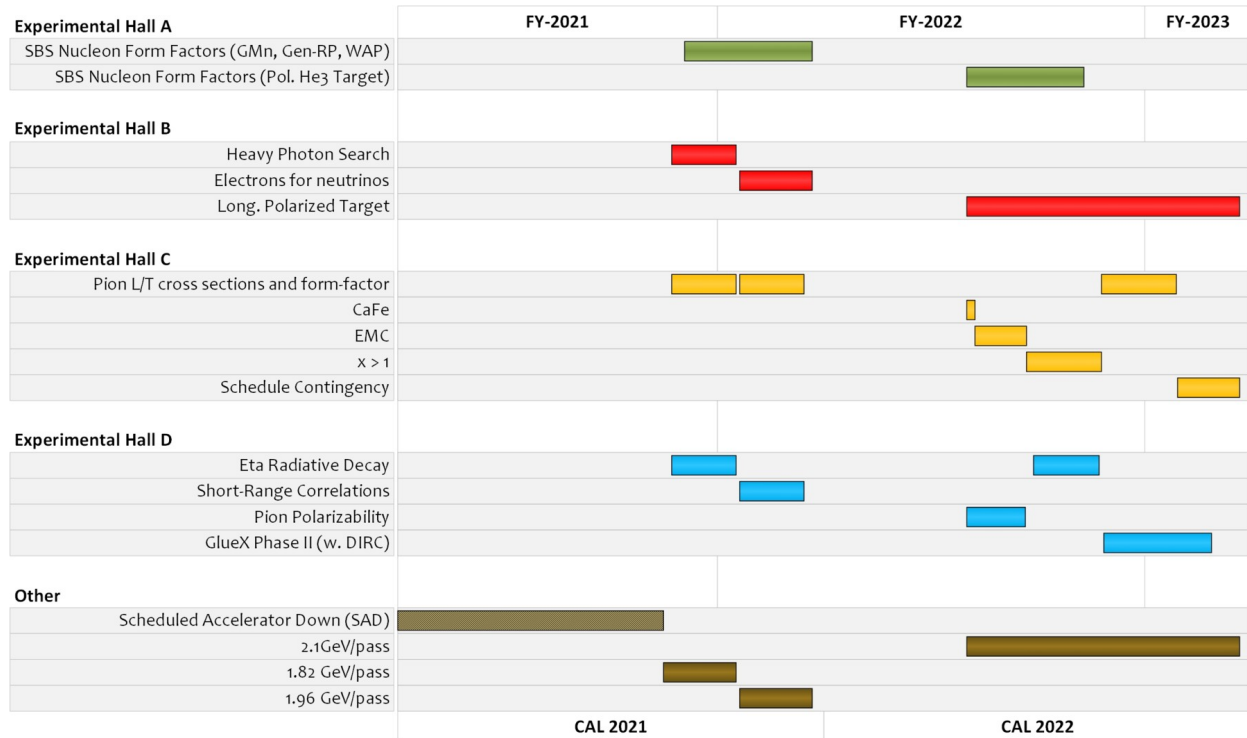
photoproduction (E12-20-008) experiments. Hall A expects to perform E12-09-016 (Neutron  $G_E^n/G_M^n$  ratio using a polarized  $^3\text{He}$  target) during CY2022.

During calendar year 2021, Hall B plans to acquire additional data on the heavy photon search (Run Group I) and to measure electron scattering cross sections from multiple nuclear targets to study short range correlations in nuclei and benchmark neutrino event selection, energy reconstruction and event generators (Run Group M). In CY2022, Hall B expects to perform measurements using a longitudinally polarized target to study the 3D structure of the nucleon for a total of 116 of the 120 PAC days assigned (Run Group C).

For 2021, Hall C plans measurements of longitudinal – transverse pion cross sections and of the charged pion form-factor at large  $Q^2$  (E12-19-006). These pion measurements will complement the data taken during summer 2019 by experiments E12-06-101 and E12-07-105. For CY2022, Hall C expects to perform measurements of short-range pairing mechanisms (E12-17-005), nuclear dependence of  $F_2$  (E12-10-008), inclusive scattering from nuclei at  $x > 1$  (E12-06-105) as well as the remaining sets of measurements needed to complete the of longitudinal – transverse pion cross sections and of the charged pion form-factor at large  $Q^2$  experiment (E12-19-006). A “schedule contingency” time has been programmed into the experiment schedule to ensure that these high-impact experiments, some requiring data taking with non-standard beam energies over multiple years, are completed as approved by the Physics Advisory Committee (PAC).

During fall 2019 – winter 2020, Hall D did study the decays of mesons and baryons to final states containing strange quarks (E12-12-002) using the newly added DIRC (Detection of Internally Reflected Cherenkov) particle detector. It will continue with those studies after resuming operations for six weeks in the period July – September 2020. For calendar year 2021, Hall D plans to acquire additional data on the  $\eta$  radiative decay width via the Primakoff effect (E12-10-011) and perform measurements of short-range correlations with real photons (E12-19-003). For CY2022, Hall D plans to measure the charged pion polarizability (E12-13-008), the final set of measurements of E12-10-011 ( $\eta$  radiative decay width via the Primakoff effect) followed by a continuation of the study the decays of mesons and baryons to final states containing strange quarks (E12-12-002) using the newly added DIRC (Detection of Internally Reflected Cherenkov) particle detector.

Figure 1 summarizes graphically the experiment schedule. Tables 1- 4 later in this memo, list those experiments that have been run to completion, partially run, scheduled for this run period and those yet to be scheduled in the “12 GeV era”.



**Figure 1 – Experiment schedule summary**

On the schedule, each Physics Advisory Committee (PAC) day is mapped into two floor days. This factor of two accounts for Accelerator and hall efficiency due to system failures (not experiment overhead). It allows for 4 hours of beam-off time for maintenance, and 8 hours of beam-off time for SRF maintenance. It also accounts for a total of up to 12 hours a week of scheduled beam studies and RF recovery. An additional 8 hours a week is allocated for beam tuning to support program changes, beam tuning to address beam quality issues and to restore beam operations for physics post beam studies/maintenance periods. The remaining 136 hours a week, 87 % of beam-on time, is scheduled as research.

The Jefferson Lab Nuclear Physics Experiment Scheduling Committee developed the schedule. Committee members are: Marco Battaglieri, Eugene Chudakov, Rolf Ent (Co-Chair), Camille Ginsburg (Co-Chair), Javier Gomez, Cynthia Keppel, Robert McKeown, Matt Poelker, Patrizia Rossi and, Mike Spata. The schedule has been reviewed and approved by the Director

## Scheduling Status of Experiments

**Table 1 - Completed Experiments**

Experiment	Hall	Contact	Beam Req. Submitted
Run Group F	B	S. Kuhn	28-Jul-2017
E12-06-102	D	C. Meyer	1-Aug-2014
E12-06-110	C	X. Zheng	30-May-2018
E12-06-121	C	B. Sawatzky	30-May-2018
E12-07-108	A	B. Wojtsekhowski	20-Aug-2014
E12-09-002	C	K. Hafidi	2-Jul-2015
E12-09-017	C	R. Ent	2-Jul-2015
E12-10-002	C	S. Malace	21-Aug-2014
E12-10-103	A	G. Petratos	1-Sept-2014
E12-11-101	A	K. Paschke	28-Jul-2017
E12-11-106	B	A. Gasparian	22-Jun-2015
E12-12-004	A	K. Paschke	28-Jul-2017
E12-14-011	A	L. Weinstein	24-Jun-2015
E12-14-012	A	C. Mariani	26-Jun-2015
E12-15-001	C	N. Sparveris	19-Jul-2017
E12-17-003	A	L. Tang	27-Jul-2017

**Table 2 - Partially Completed Experiments**

Experiment	Hall	Contact	Beam Req. Submitted
Run Group A	B	L. Elouadrhiri	1-Jul-2015
Run Group B	B	S. Niccolai	31-Jul-2016
Run Group I	B	S. Stepanyan	27-Jul-2017
Run Group K	B	A. D'Angelo	13-Jul-2017
E12-06-101	C	G. Huber	1-Aug-2016
E12-06-107	C	D. Dutta	6-Aug-2014
E12-06-114	A	C. Hyde	6-Aug-2014
E12-07-105	C	T. Horn	1-Aug-2016
E12-09-011	C	T. Horn	2-Jul-2015
E12-10-003	C	W. Boeglin	6-Aug-2014
E12-10-008	C	D. Gaskell	6-Aug-2014
E12-10-009	A	B. Wojtsekhowski	27-Jul-2016
E12-10-011	D	A. Gasparian	1-Aug-2017
E12-11-008	LERF	P. Fisher	6-Jul-2015
E12-11-112	A	D. Higinbotham	30-Jul-2014

E12-12-002	D	M.Shepherd	23-May-2019
E12-14-009	A	D. Higinbotham	29-Jun-2015
E12-16-007	C	Z.E. Meziani	27-Jul-2017

**Table 3 - Scheduled Experiments**

\*1\* = TBD, passed ERR

\*2\* = Pending ERR completion

\*3\* = Pending results of nuclear target tests in CLAS12

Experiment	Hall	Contact	Beam Req. Submitted
Run Group C	B	S. Kuhn	*3*
Run Group M	B	O. Hen & L. Weinstein	*3*
Run Group I	B	S. Stepanyan	27-Jul-2017
E12-06-105	C	J. Arrington	28-Jul-2017
E12-10-008	C	D. Gaskell	6-Aug-2014
E12-10-011	D	A. Gasparian	1-Aug-2017
E12-12-002	D	M.Shepherd	23-May-2019
E12-13-008	D	R. Miskimen	*2*
E12-19-003	D	O. Hen	9-Sep-2020
E12-19-006	C	T. Horn & G. Huber	1-Aug-2016
E12-09-019	A	B. Wojtsekhowski	31-Jul-2017
E12-17-004	A	B. Sawatzky	10-Nov-2020
E12-17-005	C	O. Hen	31-Jul-2017
E12-20-008	A	A. Puckett	14-Dec-2020

**Table 4 - New Experiments to be Scheduled**

Note that partially completed experiments are also considered for re-scheduling

\*1\* = TBD, passed ERR

\*2\* = Pending ERR completion

\*3\* = Pending results of nuclear target tests in CLAS12

Experiment	Hall	Contact	Beam Req. Submitted
Run Group D	B	L. El Fassi	*3*
Run Group L	B	Z. Meziani	*2*
E12-06-104	C	P. Bosted	15-Aug-2019
E12-06-107	C	D. Dutta	19-Aug-2019
E12-11-107	C	S. Wood	15-Dec-2020
E12-13-003	D	C. Meyer	29-Jul-2016
E12-13-007	C	R. Ent	16-Aug-2019
E12-13-010	C	C. Muñoz Camacho	16-Aug-2019

E12-14-003	C	B. Wojtsekhowski	*1*
E12-14-005	C	D. Dutta	*1*
E12-20-010	A	E. Fuchey	10-Dec-2020

## Supplementary Scheduling Information

### Reminders

- On the schedule, daily status changes take place at the end of the owl shift (~ 7 AM) unless otherwise indicated.
- Operating one or more of Halls A, B and C at five passes together with Hall D at 5.5 passes requires a polarized gun laser frequency of 249.5 MHz for those halls. A laser frequency of 499 MHz can be used otherwise. For the same average beam current, the charge per micro-bunch when operating the laser at 249.5 MHz will be twice that of 499 MHz. For each hall, the energy, current, polarization column now also includes the laser frequency.

### The Meaning of Priority on the Accelerator Schedule

Generally, the assignment of priority to a hall means that the identified hall will have the primary voice in decisions on beam quality and/or changes in operating conditions. We will do our best to deliver the beam conditions identified in the schedule for the priority hall. It will not, however, mean that the priority hall can demand changes in beam energy that would affect planned running in the other halls without the consent of the other halls. Of course, final authority for decisions about unplanned changes in machine operation will rest with the laboratory management.

The operation of more than one hall at Jefferson Lab substantively complicates the interaction between the experimenters and the accelerator operations group. It is in the interests of the entire physics community that the laboratory be as productive as possible. Therefore, we require that the run coordinators for all operating halls do their best to respond flexibly to the needs of experiments running in other halls. The run coordinators for all experiments either receiving beam or scheduled to receive beam that day should meet with the Program Deputy at 7:45 AM in the MCC on weekdays and at the Program Deputy's discretion on weekends.

To provide some guidance and order to the process of resolving the differing requirements of the running halls, we have assigned a "priority hall" for each day beam delivery has been scheduled. We outline here the meaning of priority and its effect on accelerator operations.

### The priority hall has the right to:

- require a re-tune of the accelerator to take place immediately when beam quality is not acceptable
- insist that energy changes occur as scheduled
- obtain hall access as desired
- request that beam delivery interruptions for experiment-related operations which temporarily block normal beam delivery to all other halls take place as requested. Mott measurements of the beam polarization or pulsed operation for current monitor calibrations represent examples of such interruptions. Interruptions of this type require, at a minimum,

24 hours advance notification and coordination with the Program Deputy and the other halls.

These interruptions shall be limited by a sum rule - the total time lost to the non-priority hall(s) due to such requests shall not exceed 2.5 hours in any 24-hour period. It is, of course, highly preferred that these measurements be scheduled at the morning meeting of the run coordinators whenever possible, and coordinated between halls whenever possible.

When the priority hall has requested a re-tune, if the re-tune degrades a previously acceptable beam for one of the other, lower priority running halls, then the re-tune shall continue until the beam is acceptable to both the priority hall and the other running halls that had acceptable beam at the time the re-tune began.

#### **Non-priority halls can:**

- require that a retune of the accelerator take place within 2.5 hours of the desired time (it will nominally occur at the earliest convenient break in the priority hall's schedule)
- require access to the hall within 1 hour of the desired time (again, it will nominally occur at the earliest convenient break in the priority hall's schedule)
- request that beam delivery interruptions for experiment-related operations which temporarily block normal beam delivery to all other halls occur within 2.5 hours of the desired time. Interruptions of this type require, at a minimum, 24 hours advance notification and coordination with the Program Deputy and the other halls.

The ability of non-priority halls to request retunes and accesses shall be limited by a sum rule - the total time lost to the priority hall due to such requests shall not exceed 2.5 hours in any 24-hour period. (To facilitate more extended tuning associated with complex beam delivery, with the agreement of the run coordinators for all operating halls, the sum rule may be applied over a period as long as three days, so long as the average impact is less than 2.5 hours/day.) In the event that two non-priority halls are running, the 2.5 hours shall be split evenly between them in the absence of mutual agreement on a different split.

#### **All Halls:**

Can negotiate with other halls, and with the Accelerator and Physics Division for changes in scheduled energy changes (either direction).

#### **Initial Tune-up of New Beams:**

Normally one and one half shifts (12 hours) is set aside for tune-up whenever a new beam setup is being tuned (for unusual beam setups more time may be scheduled explicitly for tuning at the discretion of the scheduling committee). It is understood that beam tune-ups shall *always* be done in the order that the accelerator operations group believes will minimize the *total* time needed to tune *all* scheduled beams (i.e., the "priority hall" beam is not necessarily tuned first). In the event that obtaining the new beam setup requires more than the scheduled time, the Accelerator



Program Deputy is authorized to spend up to one additional shift of tuning in an effort to deliver all scheduled beams instead of just the "priority hall" beam

**Maintenance/Beam Studies.** Accelerator Division may request up to sixteen hours per week. Users will be consulted in deciding how these sixteen hours per week are placed on the calendar, i.e. five shorter or three long blocks of time.

## Accomplishments and Expectations

### Accelerator

The accelerator completed a difficult, pandemic-impacted run with full longitudinal polarization to parity experiments in Hall A, nearly full polarization to experiments in Halls B and C and beam as required to Hall D.

An updated assessment of gradient degradation indicated a 18 MeV/linac/year degradation in SRF performance in FY20, which is consistent with that from past years. The degradation is addressed in two ways: 1) new beamline vacuum procedures, to avoid worsening the degradation and 2) installation of refurbished/new cryomodules to counteract the degradation. The new procedures are intended to reduce the introduction of new particulates into the beamline and to reduce existing particulate movement within the beamline. The updated procedures align beamline work with state-of-the-art SRF procedures.

A substantial amount of North Linac beamline vacuum work has been accomplished during the 2021 SAD, using updated procedures. Several elastomer (Viton) seal gate valves, which are installed throughout the two linacs, were discovered to be radiation damaged during past cryomodule replacement. During the 2020 SAD, most north linac gate valves with radiation-sensitive elastomer seals were replaced. New radiation detectors will guide the periodic replacement of these valves. Seven girders will have been removed/replaced using small portable clean rooms; the girder beam pipes are cleaned in the Test Lab in permanent clean rooms using best practices. Three poorly performing cryomodules were removed and two refurbished units will be installed in the North Linac before the run which begins in August 2021.

The 2022 SAD, currently planned for Jan-Mar 2022 pending funding decisions, will include work on both the North and South Linacs. Remaining elastomer seal gate valves will be replaced to the extent the schedule permits. Two more modules will be swapped in the North Linac and one in the South Linac in support of the 1050 MeV/linac needed to support polarization in Hall B at fifth pass and Hall A on second, third and fourth passes in parallel. Hall C will have nearly full polarization as well although the scheduled experiments do not require it.

Between two and four more modules will be refurbished each year through 2026, funding permitting, as part of the CEBAF Performance Plan, with the goal of achieving adequate headroom to keep fault rate low or deal with another cryomodule failure while operating at the design energy of 1090 MeV/linac.

During the 2020 run it was discovered that the injector energy lock did not adequately maintain the energy defined by the injector spectrometer (an invasive device). Beam loss monitor trips near the end of the injector (OR08) frequently led to turning off the injector energy lock. The arc 1 energy lock maintained the sum of the Injector and North Linac, and the Hall A energy lock kept that energy and therefore polarization for the parity experiment fixed, but polarization to Halls B and C varied a few percent as the contribution of the North Linac changed. The 2022

Hall A experiments will be more sensitive to this effect than the 2020 run so efforts will be made to mitigate it during beam studies during the upcoming run.

Work has begun to determine the changes needed to increase current capability of CEBAF to allow for desired beam currents to all halls during the MOLLER and SoLID eras. Phase one, which includes an increased available gun voltage, improved Wien filters and injector solenoids, will be completed in the 2021 SAD. Phase two, which includes installation of a new booster cryomodule, which has been extensively tested at the UITF during the 2021 SAD, will be completed in the 2022 SAD. The increased current is non-trivial due to the 460  $\mu\text{A}$  maximum current chosen for cryomodule design in 2005, before the 2007 Environmental Assessment concluded that 1 MW each to Halls A and C would not have a significant impact. In concert with the Physics Division, a goal of 730  $\mu\text{A}$  in the North Linac has been defined. This corresponds to a total of 140  $\mu\text{A}$  to Halls A, B and C and 5  $\mu\text{A}$  to D. The 900 kW per hall limit would remain for Halls A and C to provide a safety margin for the beam dump.

Each end-station has an Accelerator Physicists Experimental Liaison (APEL) that serves to aid the Nuclear Physicists in beam related issues during all phases of an experiment, proposals, commissioning, operating and analysis. The APELs with input from the end-station scientist, injector, and diagnostics have developed a beam parameter table for the 12 GeV era (JLAB-TN-18-022). Experiments requiring more stringent beam parameters should consult the APEL of the end-station in question. What is not in this document is that there are additional constraints that need to be applied during the scheduling process. Most of these constraints derive from the new 4-hall system and are as follows:

- 4-hall operations requires at least one of the original halls (ABC) to receive 5<sup>th</sup> pass beam.
  - It is strongly preferred that the original halls be A or C. Coupling B-D, while possible, places additional constraint on B & D currents.
  - Any of the original halls receiving 5<sup>th</sup> pass beam concurrently with Hall-D will receive beam with a 249.5 MHz repetition rate.
  - 499 MHz repetition rate is available when a hall is receiving pass 1-4 beam.
- Hall-D must be at 249.5 MHz repetition rate whenever an original hall is simultaneously receiving 5<sup>th</sup> pass beam.
- Hall-D can only receive 499 MHz beam when only two of the original halls are receiving beam on the lower passes (1-4). In this case, only three halls are in operation.
- Work is underway to allow lower frequency sub-harmonics of 499 MHz, albeit not as low as some proposals have requested, to allow time-of-flight measurement due to space charge concerns.

## Hall A

Installation and running of the PREX-II (E12-11-101) and CREX (E12-12-004) experiments took place in Summer and Fall 2019. These experiments utilize parity violating electron scattering to measure the neutron radii of lead and calcium and have important implications for nuclear structure including three neutron forces, atomic parity violation, and astrophysics. Following the completion of CREX in the Summer of 2020, installation for the SuperBigBite spectrometer started. This multi-faceted program includes four measurements of the proton and neutron form factors, a semi-inclusive measurement aimed at transverse momentum distributions within the nucleon, and tagged measurements of pion and kaon structure functions. The plan is to start with elastic scattering measurements of the neutron magnetic and electric elastic form factors  $G_M^n$  (Experiment E12-09-019),  $G_E^n$ -RP (Experiment E12-17-004) and polarization transfer in wide-angle charged pion photoproduction (E12-20-008).

## Hall B

Five run groups collected data in Hall-B since 2018. The first, Run Group A (RG-A), a collection of 13 individual experiments, took data at 10.6 GeV and 10.2 GeV beam energies at three settings. The RG-A is approved to run for 139 days: so far it used 55 PAC days (40%) and accumulated about 280 mC of beam charge. A short, opportunistic run for RG-K took place in December of 2018 using low energy beams in Hall-B at 7.5 GeV and 6.5 GeV. The RG-K is composed of three individual experiments and is approved for 100 PAC days. The run was 18 calendar days long and accumulated an integrated charge of 50 mC. In spring and fall of 2019 and January 2020, the RG-B took data at three beam energies, 10.6 GeV, 10.2 GeV, and 10.4 GeV. This run group serves 7 individual experiments approved to run for 90 PAC days, all using liquid deuterium as target material. RG-B used 39 PAC days and accumulated 155 mC of beam charge. In between RG-B runs, during summer 2019, RG-I (HPS) took data at 4.4 GeV beam energy utilizing about 31 PAC days of beam time. At the end of the RG-B, a short test run with nuclear targets took place to validate the neutron flux estimates and verify the performance of the CLAS12 CVT. The fifth run to take data in Hall-B was RG-F. At the beginning of February 2020, the BONUS12 tracking detector was installed inside the CLAS12 solenoid magnet. The experiment used 39 PAC days from February 12 to March 24 and 35 PAC days between August 2 to September 21 for a total of 74 PAC days (over 80 PAC days approved). The RG-F collected the full expected beam charge.

In CY2021 we are expecting to run RG-I (Heavy Photon Search or HPS experiment) with low energy beam (3.7 GeV) from August 23 to October 16 for a total of 27 PAC days and RG-M (SRC in nuclei and nuclear for neutrino experiments) from October 20 to December 20 for a total of 31 PAC days (over 45 PAC days assigned).

In CY 2022 Hall B expects to perform measurements using a longitudinally polarized target to study the 3D structure of the nucleon for a total of 116 PAC days over the 120 PAC days assigned.

## Hall C

In the spring of 2019, Hall C ran E12-16-007, a search for the LHCb charmed “pentaquark” using photoproduction of  $J/\Psi$  at threshold, followed by E12-09-002, a search for charge symmetry violating quark distributions via measurement of the  $\pi^+/\pi^-$  ratio in semi-inclusive deep-inelastic scattering, and E12-09-011, a study of L-T separated exclusive Kaon electroproduction cross sections. For the summer 2019 run cycle, Hall C leveraged the unique beam energies available to facilitate the kinematic reach for longitudinal – transverse studies of pion electroproduction, with studies of the pion form factor (E12-06-101) and scaling in exclusive pion electroproduction (E12-07-105). E12-15-001, a measurement of the proton’s generalized polarizabilities in virtual Compton scattering followed. After the summer running, the standard cryotarget was replaced with a polarized Helium-3 target. Commissioning of this target started in late 2019 in early 2020 data was taken for E12-06-110, a measurement of the neutron spin asymmetry  $A_1^n$  in the valence quark region.  $A_1^n$  ran until mid-March when the configuration of the target was changed for E12-06-121, a measurement of the neutron  $g_2$  and  $d_2$  structure functions to access the neutron color polarizability. This experiment started commissioning but was shut down when the lab went to MEDCON6. When operations were resumed later in 2020, E12-06-121 resumed and ran for the duration of the summer 2020 run. During the scheduled down, maintenance work in the hall includes replacing the HMS quadrupole power supplies and upgrading the HMS trigger hodoscope. The polarized Helium-3 target has been removed to be replaced by the standard target assembly. In the fall of 2021, the Hall will run E12-19-006, a study of L-T separated pion electroproduction cross sections and measurement of the pion form factor to high  $Q^2$ . In 2022, the hall expects to perform measurements of short-range pairing mechanisms (E12-17-005), nuclear dependence of  $F_2$  (E12-10-008), inclusive scattering from nuclei at  $x > 1$  (E12-06-105) as well as the remaining sets of measurements needed to complete the of longitudinal – transverse pion cross sections and of the charged pion form-factor at large  $Q^2$  experiment (E12-19-006). A “schedule contingency” time has been programmed into the experiment schedule to ensure that these high-impact experiments are completed.

## Hall D

During the Fall run of 2019 the commissioning of the DIRC detector was completed. In spring 2020 the GlueX-II experiment E12-12-002 (with the DIRC) ran for nearly 11 weeks. The DAQ system has been upgraded and ran reliably at about 80kHz event rate and 1.1 GB/s data rate. In summer-fall 2020 the same experiment continued taking data for 6 weeks (in total the experiment is about 33% complete). During the fall 2020 – summer 2021 shutdown Hall D plans to do a part of the modifications to the downstream platform needed for the E12-13-008 (pion polarizability) experiment. The schedule for 2021 is to run E12-19-003 till completion, at 10.9 GeV, and E12-10-011 at 10.1 GeV for completion of the LHe target data taking. The current

plan for 2022 is to run E12-13-008 to completion, E12-10-011 to completion, and E12-12-002, depending on the total accelerator running time in 2022.





	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
93	11/08/21	Monday	1.96	Physics	E12-09-019	4.03/40/-/500	Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	D/A/B/C	2/3/4/5.5	
94	11/09/21	Tuesday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	D/A/B/C	2/3/4/5.5	
95	11/10/21	Wednesday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	A/B/C/D	2/3/4/5.5	
96	11/11/21	Thursday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	A/B/C/D	2/3/4/5.5	
97	11/12/21	Friday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	A/B/C/D	2/3/4/5.5	
98	11/13/21	Saturday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	A/B/C/D	2/3/4/5.5	
99	11/14/21	Sunday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	A/B/C/D	2/3/4/5.5	
100	11/15/21	Monday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	B/C/D/A	2/3/4/5.5	
101	11/16/21	Tuesday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	B/C/D/A	2/3/4/5.5	
102	11/17/21	Wednesday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	B/C/D/A	2/3/4/5.5	
103	11/18/21	Thursday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	B/C/D/A	2/3/4/5.5	
104	11/19/21	Friday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	B/C/D/A	2/3/4/5.5	
105	11/20/21	Saturday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	B/C/D/A	2/3/4/5.5	
106	11/21/21	Sunday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	B/C/D/A	2/3/4/5.5	
107	11/22/21	Monday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	C/D/A/B	2/3/4/5.5	
108	11/23/21	Tuesday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	C/D/A/B	2/3/4/5.5	
109	11/24/21	Wednesday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	C/D/A/B	2/3/4/5.5	
110	11/25/21	Thursday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	C/D/A/B	2/3/4/5.5	
111	11/26/21	Friday	1.96	Physics			Run Group M	6.0/200/-/500	E12-19-006	8.0/70/-/500	E12-19-003	10.9/440/-/250	C/D/A/B	2/3/4/5.5	
112	11/27/21	Saturday	1.96	Physics	PASS CHANGE		Run Group M	6.0/200/-/500	PASS CHANGE		E12-19-003	10.9/440/-/250	C/D/A/B	2/3/5/5.5	
113	11/28/21	Sunday	1.96	Physics	E12-09-019	7.95/40/-/500	Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	C/D/A/B	2/3/5/5.5	
114	11/29/21	Monday	1.96	Physics	E12-09-019	Reconfigure	Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	D/A/B/C	-/3/5/5.5	
115	11/30/21	Tuesday	1.96	Physics	E12-09-019	7.95/40/-/500	Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	D/A/B/C	-/3/5/5.5	
116	12/01/21	Wednesday	1.96	Physics	E12-09-019	7.95/40/-/500	Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	D/A/B/C	-/3/5/5.5	
117	12/02/21	Thursday	1.96	Physics	E12-09-019	7.95/40/-/500	Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	D/A/B/C	-/3/5/5.5	
118	12/03/21	Friday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	D/A/B/C	-/3/5/5.5	
119	12/04/21	Saturday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	D/A/B/C	-/3/5/5.5	
120	12/05/21	Sunday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	D/A/B/C	-/3/5/5.5	
121	12/06/21	Monday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	A/B/C/D	-/3/5/5.5	
122	12/07/21	Tuesday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	A/B/C/D	-/3/5/5.5	
123	12/08/21	Wednesday	1.96	Physics	Sched. Contingency		Run Group M	6.0/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	A/B/C/D	-/3/5/5.5	
124	12/09/21	Thursday	1.96	Physics	Sched. Contingency		PASS CHANGE		E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	A/B/C/D	-/1/5/5.5	
125	12/10/21	Friday	1.96	Physics	Sched. Contingency		Run Group M	2.1/200/-/500	E12-19-006	9.9/70/-/250	E12-19-003	10.9/440/-/250	A/B/C/D	-/1/5/5.5	
126	12/11/21	Saturday	1.96	Physics	Sched. Contingency		Run Group M	2.1/200/-/500	PASS CHANGE		E12-19-003	10.9/440/-/250	A/B/C/D	-/1/3/5.5	
127	12/12/21	Sunday	1.96	Physics	Sched. Contingency		Run Group M	2.1/200/-/500	E12-19-006	6.0/70/-/500	E12-19-003	10.9/440/-/250	A/B/C/D	-/1/3/5.5	
128	12/13/21	Monday	1.96	Physics	Sched. Contingency		Run Group M	2.1/200/-/500	E12-19-006	6.0/70/-/500	E12-19-003	10.9/440/-/250	B/C/D/A	-/1/3/5.5	
129	12/14/21	Tuesday	1.96	Physics	Sched. Contingency		PASS CHANGE		Sched. Contingency		Sched. Contingency		B/C/D/A	-/2/-/-	
130	12/15/21	Wednesday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency		Sched. Contingency		B/C/D/A	-/2/-/-	
131	12/16/21	Thursday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency		Sched. Contingency		B/C/D/A	-/2/-/-	
132	12/17/21	Friday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency		Sched. Contingency		B/C/D/A	-/2/-/-	
133	12/18/21	Saturday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency		Sched. Contingency		B/C/D/A	-/2/-/-	
134	12/19/21	Sunday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency		Sched. Contingency		B/C/D/A	-/2/-/-	
135	12/20/21	Monday	1.96	Physics	Sched. Contingency		Run Group M	4.0/200/-/500	Sched. Contingency		Sched. Contingency		B/C/D/A	-/2/-/-	
136	12/21/21	Tuesday		OFF											
137	12/22/21	Wednesday													
138	12/23/21	Thursday													
139	12/24/21	Friday													
140	12/25/21	Saturday													
141	12/26/21	Sunday													
142	12/27/21	Monday													
143	12/28/21	Tuesday													
144	12/29/21	Wednesday													
145	12/30/21	Thursday													
146	12/31/21	Friday													
147															
148															
149															
150															
151															
152	4/25/2022	Monday	2.1	Restore											
153	4/26/2022	Tuesday	2.1	Restore											
154	4/27/2022	Wednesday	2.1	Restore											
155	4/28/2022	Thursday	2.1	Restore											
156	4/29/2022	Friday	2.1	Restore											
157	4/30/2022	Saturday	2.1	Restore											
158	5/1/2022	Sunday	2.1	Restore											
159	5/2/2022	Monday	2.1	Physics	E12-09-016	4.3/30/p/500	Run Group C	2.2/200/p/500	E12-17-005	10.6/40/-/250	E12-13-008	11.7/60/-/250	A/B/C/D	2/1/5/5.5	
160	5/3/2022	Tuesday	2.1	Physics	E12-09-016	4.3/30/p/500	Run Group C	2.2/200/p/500	E12-17-005	10.6/40/-/250	E12-13-008	11.7/60/-/250	A/B/C/D	2/1/5/5.5	
161	5/4/2022	Wednesday	2.1	Physics	E12-09-016	4.3/30/p/500	Run Group C	2.2/200/p/500	E12-17-005	10.6/40/-/250	E12-13-008	11.7/60/-/250	A/B/C/D	2/1/5/5.5	
162	5/5/2022	Thursday	2.1	Physics	E12-09-016	4.3/30/p/500	Run Group C	2.2/200/p/500	E12-17-005	10.6/40/-/250	E12-13-008	11.7/60/-/250	B/C/D/A	2/1/5/5.5	
163	5/6/2022	Friday	2.1	Physics	E12-09-016	4.3/30/p/500	PASS CHANGE		E12-17-005	10.6/40/-/250	E12-13-008	11.7/60/-/250	B/C/D/A	2/5/5/5.5	
164	5/7/2022	Saturday	2.1	Physics	E12-09-016	4.3/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-17-005	10.6/40/-/250	E12-13-008	11.7/60/-/250	B/C/D/A	2/5/5/5.5	
165	5/8/2022	Sunday	2.1	Physics	E12-09-016	4.3/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-17-005	10.6/40/-/250	E12-13-008	11.7/60/-/250	C/D/A/B	2/5/5/5.5	
166	5/9/2022	Monday	2.1	Physics	E12-09-016	4.3/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-17-005	10.6/40/-/250	E12-13-008	11.7/60/-/250	C/D/A/B	2/5/5/5.5	
167	5/10/2022	Tuesday	2.1	Physics	PASS CHANGE		Run Group C/FT ON	10.6/200/p/250	E12-10-008	10.6/60/-/250	E12-13-008	11.7/60/-/250	C/D/A/B	3/5/5/5.5	
168	5/11/2022	Wednesday	2.1	Physics	E12-09-016	6.4/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-10-008	10.6/60/-/250	E12-13-008	11.7/60/-/250	D/A/B/C	3/5/5/5.5	
169	5/12/2022	Thursday	2.1	Physics	E12-09-016	6.4/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-10-008	10.6/60/-/250	E12-13-008	11.7/60/-/250	D/A/B/C	3/5/5/5.5	
170	5/13/2022	Friday	2.1	Physics	E12-09-016	6.4/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-10-008	10.6/60/-/250	E12-13-008	11.7/60/-/250	D/A/B/C	3/5/5/5.5	
171	5/14/2022	Saturday	2.1	Physics	E12-09-016	6.4/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-10-008	10.6/60/-/250	E12-13-008	11.7/60/-/250	B/C/A/D	3/5/5/5.5	
172	5/15/2022	Sunday	2.1	Physics	E12-09-016	6.4/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-10-008	10.6/60/-/250	E12-13-008	11.7/60/-/250	B/C/A/D	3/5/5/5.5	
173	5/16/2022	Monday	2.1	Physics	E12-09-016	6.4/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-10-008	10.6/60/-/250	E12-13-008	11.7/60/-/250	B/C/A/D	3/5/5/5.5	
174	5/17/2022	Tuesday	2.1	Physics	E12-09-016	6.4/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-10-008	10.6/60/-/250	E12-13-008	11.7/60/-/250	B/C/A/D	3/5/5/5.5	
175	5/18/2022	Wednesday	2.1	Physics	E12-09-016	6.4/30/p/500	Run Group C/FT ON	10.6/200/p/250	E12-10-008	10.6/60/-/250	E12-13-008	11.7/60/-/250	B/C/A/D	3/5/5/5.5	
176	5/19/2022														







	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
366	11/25/2022	Friday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		E12-12-002	11.7/200/-/250	B/D	--/5/-/5.5	
367	11/26/2022	Saturday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		E12-12-002	11.7/200/-/250	B/D	--/5/-/5.5	
368	11/27/2022	Sunday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
369	11/28/2022	Monday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
370	11/29/2022	Tuesday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
371	11/30/2022	Wednesday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
372	12/1/2022	Thursday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
373	12/2/2022	Friday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
374	12/3/2022	Saturday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
375	12/4/2022	Sunday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
376	12/5/2022	Monday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
377	12/6/2022	Tuesday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
378	12/7/2022	Wednesday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
379	12/8/2022	Thursday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
380	12/9/2022	Friday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
381	12/10/2022	Saturday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
382	12/11/2022	Sunday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
383	12/12/2022	Monday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
384	12/13/2022	Tuesday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
385	12/14/2022	Wednesday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
386	12/15/2022	Thursday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
387	12/16/2022	Friday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
388	12/17/2022	Saturday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
389	12/18/2022	Sunday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
390	12/19/2022	Monday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
391	12/20/2022	Tuesday	2.1	Physics	Install		Run_Group C/FT OFF	10.6/200/p/250	Schedule Contingency		TBD		B	--/5/-/---	
392	12/21/2022	Wednesday		OFF											
393	12/22/2022	Thursday													
394	12/23/2022	Friday													
395	12/24/2022	Saturday													
396	12/25/2022	Sunday													
397	12/26/2022	Monday													
398	12/27/2022	Tuesday													
399	12/28/2022	Wednesday													
400	12/29/2022	Thursday													
401	12/30/2022	Friday													
402	12/31/2022	Saturday													

WINTER/SPRING SCHEDULED ACCELERATOR DOWN