**PrimEx-D Commissioning Run Plan (August - November 2022)**

**Possible extension until December 18, 2022 (for 19 days)**

**Duration of the run:** Aug 27 – Nov 30, 94 days

**General conditions:**

* 10-4  R.L. Al radiator for production runs, 2⋅10-5 R.L. Al radiator for CCAL calibration and TAC runs
* 5 mm collimator, 750 μm Be PS converter
* Targets: Be and LHe4

- Solenoid magnet switched ON for most production runs except Compton calibration runs on Be target (see below), all sub-detectors are switched on

* Beam current and conditions for drift chambers

|  |  |  |
| --- | --- | --- |
| Solenoid Magnet ON, production on He target | | |
|  | | |
| CDC / FDC | ON | 200 nA |

|  |  |  |
| --- | --- | --- |
| Solenoid Magnet OFF, Compton Calibration on Be target | | |
|  | | |
| CDC / FDC | OFF | 200 nA |
| CDC / FDC | ON | 50 nA, 100 nA |
|  |  |  |

**Trigger type:** CCAL & FCAL, FCAL, FCAL & ST (TBD)

` PS, random, front panel LEDs

**Sequence of the planned work**: see the Table on the next page:

**Beam Restoration and Detector Calibration**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Time  (shifts) | Beam  current (nA) | Radiator  (X0) | CCAL  position | TAC  position | Solenoid  field | CDC/FDC |
| **No target** |  |  |  |  |  |  |  |
| -Tune beam to tagger Hall  -Ion chamber calibration  Radiation Monitor check  -Harp scan for the electron  beam  - Radiation Monitor check  - PS harp scan  - Active collimator check | 3  0.6  0.3  0.2  0.2  0.5 | 10-100  10-100 | 10-4  10-4 | retracted | retracted | on | on |
|  |  |  |  |  |  |  |  |
| Initial detector check out  - TAGH, PS voltage scan  - TAGM voltage scan,  CCAL, TAC | 1 | 10-100 | 10-4 | inserted | retracted |  |  |
| Equalize CCAL gains  (calibrate CCAL) | 8 | ~2 | 2⋅10-5 | Snake scan  in the beam | inserted |  |  |
| TAC run | 2 | ~2 | 2⋅10-5 | in the beam | inserted |  |  |
| Production on Be empty target | 2 | 200 | 10-4 | inserted | retracted | on | on |
|  |  |  |  |  |  |  |  |
| **Switch off solenoid magnet (target change)** | 1.5 | 50 | 10-4 | inserted |  | ramping down | on |
| **Total** | ~5 days |  |  |  |  |  |  |

**Production on Be target**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Time  (shifts) | Beam  current (nA) | Radiator  (X0) | CCAL  position | TAC  position | Solenoid  field | CDC/FDC |
| **Install Be target**  mount, install ST, align | 3 |  |  |  |  | off | on |
|  |  |  |  |  |  |  |  |
| **Switch on solenoid magnet** | 1.5 | 50 | 10-4 | inserted | retracted |  |  |
|  |  |  |  |  |  |  |  |
| Trigger and DAQ study  for physics | 2 | 10-100 | 10-4 |  |  | on | on |
| Detector checkout and  calibration  - raw mode for ADCs  Take data for FCAL gain equalization and calibration | 3 | 10-100 | 10-4 |  |  |  |  |
| FCAL HV tuning | 1 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Data production** |  |  |  |  |  |  |  |
| Compton run at small beam  current (Be target) | 2  2 | 50  100 | 10-4 |  |  |  |  |
| Compton run at the nominal  beam current | 8 | 200 | 10-4 |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Switch off solenoid magnet** | 1.5 | 50 | 10-4 |  |  | Ramping down |  |
|  |  |  |  |  |  |  |  |
| FDC straight track run | 0.5 | 50 | 10-4 |  |  | off | on |
| Compton run at small beam  intensity (Be target) | 2 | 50 | 10-4 |  |  | off | on |
| Compton run at the nominal  beam current | 4 | 200 | 10-4 |  |  | off | off |
| **Total** | ~7.5 days |  |  |  |  |  |  |

**Production on LHe target**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Time  (shifts) | Beam  current (nA) | Radiator  (X0) | CCAL  position | TAC  position | Solenoid  field | CDC/FDC |
| **Install LH4 target**  mount, install ST, align | 3 |  |  |  |  | off | off |
|  |  |  |  |  |  |  |  |
| **Fill the target**  **Switch on solenoid magnet** | 1.5 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Production run at the nominal luminosity | 5 | 200 | 10-4 | inserted | retracted | on | on |
| Production run at small  Luminosity | 2  2 | 50  100 | 10-4 |  |  |  |  |
| High luminosity run (optional) | 2 | 400 | 10-4 |  |  |  |  |
| Alternate production runs with the empty target runs 70 % / 30 % | the rest of the run | 200 | 10-4 |  |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Study systematics** |  |  |  |  |  |  |  |
| Second TAC run at the end  of the experiment  Take Compton data with the reduced PS magnetic field. A TAC run will be needed when the field is changed (optional)  Runs to evaluate trigger efficiency (TDB) | 2  2 – 3  1 |  |  |  |  |  |  |

Time is estimated assuming that the accelerator beam efficiency is better than 50 %.

One shift corresponds to 6 hours

**Detector preparation:**