

## DC Runs to study efficiency, resolution and high-lumi operation (~2 shifts)

For the DC, we would like to take data under different conditions to study the effects of different HV settings on efficiencies and resolutions as well as gathering data for high-lumi operation. The required measurements for efficiency/resolutions can be separated from the high-lumi data and can be taken at different times. We estimate that all the tests will be overall 2 shifts.

### Efficiency/Resolution study: ~ 1.5 shift (early in the beam time)

Requirements:

- Deuteron Target
- Established production settings i.e. beam setup, trigger checkout done
- Electron trigger
- Stable 30-50nA beam current

The goal is to determine optimized HV settings for DC efficiency (and partly resolution). The study requires collected data with sufficient statistics (~50M) for calibration and analysis of physics channels. The current setting from RGM/C is R1=10 , R2=10 and R3=10 (10, 10, 10). Bast on previous studies during RGC, we expect that setting (10,11,11) would be used for RGD which improves efficiency and resolution. The test plan focus on these two settings with an additional of 2 more settings just for the efficiency with lower number of events.

HV Settings for study:

| Region 1 HV | Region 2 HV | Region 3 HV | Statistics Goal | Resolution determination | Efficiency determination | Completed | Run Number |
|-------------|-------------|-------------|-----------------|--------------------------|--------------------------|-----------|------------|
| 10          | 10          | 10          | 50M             | yes                      | yes                      |           |            |
| 10          | 11          | 11          | 50M             | yes                      | yes                      |           |            |
| 11          | 12          | 12          | 10M             | -                        | yes                      |           |            |
| 9           | 9           | 9           | 10M             | -                        | yes                      |           |            |

We estimated that 50M is about 1h-1.5h at 40nA. Therefore, the plan will take about one shift to measure all the 50M runs and to complete the 10M event runs. The (10, 10, 10) run can be also part of other detector checkouts since this will be the initial DC HV setting.

### High-lumi study: ~ 1.5h (could be later in the beam time)

Requirements:

- (Established production HV setting)
- Beam operation possible up to 100nA on LD2 (or 150 on LH2)
- LD2 target (or LH2 target)

The goal is to collect data to determine HV currents as a function of beam current and fill gaps from previous measurements during the nuclear target test run when the HV supply was limited to 40uA HV currents. We just need EPICs for this and no DAQ. The plan is to increase the beam currents in steps of 10nA from 30-100nA (7 steps) and wait till we have a stable 30s-60s of beam. The HV current information is automatically stored and will be analyzed later together with the beam currents. In parallel, screenshots of the DC HV will be

logged. For each HV setting the current scan should take about 15min. If HV trips at higher beam currents it will be kept off until the next HV setting and a logbook entry will be made. Alternatively, the scan can be split in different parts and done between in between luminosity runs. That would mean that the beam current is kept stable and a scan is conducted through the HV settings

The HV settings for this test are:

| Region 1 HV | Region 2 HV | Region 3 HV |
|-------------|-------------|-------------|
| 9           | 9           | 9           |
| 10          | 10          | 10          |
| 11          | 11          | 11          |
| 12          | 12          | 12          |
| 12          | 13          | 13          |

\*this setting needs a careful increasement of beam currents to avoid any DC issues.