

# $x > 1$ and EMC Effect (XEM2) Run Plan

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## 0.1 Charge Symmetric Background Studies at $10^\circ/35^\circ$ - Part I

- All data in this section will be taken with the **PROTON** polarity.
- After the first three runs, all data will be taken with SHMS HV TURNED OFF for S1X paddles 1-5 and S2X paddles 1-6

### 0.1.1 Setting 1

- Set HMS momentum to **+2.40 GeV**.
- SHMS angle:  **$10^\circ$**
- SHMS momentum: **+9.2 GeV**
- HMS angle:  **$35^\circ$**
- Trigger: SHMS/HMS PS3 (ELCLEAN) **OR** SHMS/HMS PS1 (3/4)
- **Important note on the prescales:** All the other prescales that are NOT specified on each row at the Table 1 and Table 2 should be set to **-1**.
- **Prescale values are only estimated; adjust them on both SHMS and HMS Prescale GUIs accordingly to keep the rates below 4 kHz.**
- Take data with the SHMS and HMS simultaneously.

Table 1: CSB kinematics; quick comparison of acceptance vs. disabled SHMS S1X and S2X paddles. HMS runs not needed for these three runs

Setting	HV off		SHMS PS		Target	$I$ ( $\mu A$ )	Est. Time	Done ?
	S1X	S2X	PS1	PS2				
<b>1</b>	none	none	0	-1	LD2	60	10 min	
	1-4	1-5	0	-1	LD2	60	10 min	
	1-5	1-6	0	-1	LD2	60	10 min	

Table 2: CSB Studies at  $35^\circ$  - Setting 1 **SHMS S1X(1-5) and S2X(1-6) HV TURNED OFF**

Target	$I$ ( $\mu\text{A}$ )	HMS PS			SHMS PS			Est. Time	Done ?
		PS1	PS2	PS3	PS1	PS2	PS3		
LD2	60	-1	-1	0	-1	-1	0	10 min	
LD2	60	0	-1	-1	0	-1	-1	5 min	
40Ca	60	0	-1	-1	0	-1	-1	5 min	
40Ca	60	-1	-1	0	-1	-1	0	10 min	
12C	60	-1	-1	0	-1	-1	0	10 min	
12C	60	0	-1	-1	0	-1	-1	5 min	

### 0.1.2 Setting 2

- Set **HMS momentum** to **+2.11 GeV**.
- **SHMS angle:  $10^\circ$**
- **SHMS momentum: +9.2 GeV**
- **HMS angle:  $35^\circ$**
- **Trigger: SHMS/HMS PS3 (ELCLEAN) OR SHMS/HMS PS1 (3/4)**
- **Important note on the prescales:** All the other prescales that are NOT specified on each row at the Table 3 should be set to **-1**.
- **Prescale values are only estimated; adjust them on both SHMS and HMS Prescale GUIs accordingly to keep the rates below 4 kHz.**
- Take data with the SHMS and HMS simultaneously.

Table 3: CSB Studies at  $35^\circ$  - Setting 2 **SHMS S1X(1-5) and S2X(1-6) HV TURNED OFF**

Target	$I$ ( $\mu\text{A}$ )	HMS PS			SHMS PS			Est. Time	Done ?
		PS1	PS2	PS3	PS1	PS2	PS3		
12C	60	0	-1	-1	0	-1	-1	5 min	
12C	60	-1	-1	0	-1	-1	0	10 min	
40Ca	60	-1	-1	0	-1	-1	0	10 min	
40Ca	60	0	-1	-1	0	-1	-1	5 min	
LD2	60	0	-1	-1	0	-1	-1	5 min	
LD2	60	-1	-1	0	-1	-1	0	10 min	

### 0.1.3 Setting 3

- Set HMS momentum to +1.86 GeV.
- SHMS angle: 10°
- SHMS momentum: +9.2 GeV
- HMS angle: 35°
- Trigger: SHMS/HMS PS3 (ELCLEAN) **OR** SHMS/HMS PS1 (3/4)
- Important note on the prescales: All the other prescales that are NOT specified on each row at the Table 4 should be set to -1.
- Prescale values are only estimated; adjust them on both SHMS and HMS Prescale GUIs accordingly to keep the rates below 4 kHz.
- Take data with the SHMS and HMS simultaneously.

Table 4: CSB Studies at 35° - Setting 3 SHMS S1X(1-5) and S2X(1-6) HV **TURNED OFF**

Target	$I$ ( $\mu$ A)	HMS PS			SHMS PS			Est. Time	Done ?
		PS1	PS2	PS3	PS1	PS2	PS3		
LD2	60	-1	-1	0	-1	-1	0	10 min	
LD2	60	0	-1	-1	0	-1	-1	5 min	
LH2	60	0	-1	-1	0	-1	-1	5 min	
LH2	60	-1	-1	0	-1	-1	0	10 min	
Al dummy	40	-1	-1	0	-1	-1	0	10 min	
Al dummy	40	0	-1	-1	0	-1	-1	5 min	
Be	60	0	-1	-1	0	-1	-1	5 min	
Be	60	-1	-1	0	-1	-1	0	10 min	
40Ca	60	-1	-1	0	-1	-1	0	10 min	
40Ca	60	0	-1	-1	0	-1	-1	5 min	
12C	60	0	-1	-1	0	-1	-1	5 min	
12C	60	-1	-1	0	-1	-1	0	10 min	
B4C11	60	-1	-1	0	-1	-1	0	10 min	
B4C11	60	0	-1	-1	0	-1	-1	5 min	
B4C10	60	0	-1	-1	0	-1	-1	5 min	
B4C10	60	-1	-1	0	-1	-1	0	10 min	

#### 0.1.4 Setting 4

- Set **HMS momentum** to **+1.63 GeV**.
- **SHMS angle: 10°**
- **SHMS momentum: +9.2 GeV**
- **HMS angle: 35°**
- **Trigger: SHMS/HMS PS3 (ELCLEAN) OR SHMS/HMS PS1 (3/4)**
- **Important note on the prescales:** All the other prescales that are NOT specified on each row at the Table 5 should be set to **-1**.
- **Prescale values are only estimated; adjust them on both SHMS and HMS Prescale GUIs accordingly to keep the rates below 4 kHz.**
- Take data with the SHMS and HMS simultaneously.

Table 5: CSB Studies at 35° - Setting 4 **SHMS S1X(1-5) and S2X(1-6) HV TURNED OFF**

Target	$I$ ( $\mu\text{A}$ )	HMS PS			SHMS PS			Est. Time	Done ?
		PS1	PS2	PS3	PS1	PS2	PS3		
B4C10	60	-1	-1	0	-1	-1	0	10 min	
B4C10	60	0	-1	-1	0	-1	-1	5 min	
B4C11	60	0	-1	-1	0	-1	-1	5 min	
B4C11	60	-1	-1	0	-1	-1	0	10 min	
12C	60	-1	-1	0	-1	-1	0	10 min	
12C	60	0	-1	-1	0	-1	-1	5 min	
40Ca	60	0	-1	-1	0	-1	-1	5 min	
40Ca	60	-1	-1	0	-1	-1	0	10 min	
Al dummy	40	-1	-1	0	-1	-1	0	10 min	
Al dummy	40	0	-1	-1	0	-1	-1	5 min	
Be	60	0	-1	-1	0	-1	-1	5 min	
Be	60	-1	-1	0	-1	-1	0	10 min	
LH2	60	-1	-1	0	-1	-1	0	10 min	
LH2	60	0	-1	-1	0	-1	-1	5 min	
LD2	60	0	-1	-1	0	-1	-1	5 min	
LD2	60	-1	-1	0	-1	-1	0	10 min	

### 0.1.5 Setting 5

- Set HMS momentum to +1.44 GeV.
- SHMS angle: 10°
- SHMS momentum: +9.2 GeV
- HMS angle: 35°
- Trigger: SHMS/HMS PS3 (ELCLEAN) **OR** SHMS/HMS PS1 (3/4)
- Important note on the prescales: All the other prescales that are NOT specified on each row at the Table 4 should be set to -1.
- Prescale values are only estimated; adjust them on both SHMS and HMS Prescale GUIs accordingly to keep the rates below 4 kHz.
- Take data with the SHMS and HMS simultaneously.

Table 6: CSB Studies at 35° - Setting 5 SHMS S1X(1-5) and S2X(1-6) HV **TURNED OFF**

Target	$I$ ( $\mu$ A)	HMS PS			SHMS PS			Est. Time	Done ?
		PS1	PS2	PS3	PS1	PS2	PS3		
LD2	60	-1	-1	0	-1	-1	0	10 min	
LD2	60	0	-1	-1	0	-1	-1	5 min	
LH2	60	0	-1	-1	0	-1	-1	5 min	
LH2	60	-1	-1	0	-1	-1	0	10 min	
Al dummy	40	-1	-1	0	-1	-1	0	10 min	
Al dummy	40	0	-1	-1	0	-1	-1	5 min	
Be	60	0	-1	-1	0	-1	-1	5 min	
Be	60	-1	-1	0	-1	-1	0	10 min	
40Ca	60	-1	-1	0	-1	-1	0	10 min	
40Ca	60	0	-1	-1	0	-1	-1	5 min	
12C	60	0	-1	-1	0	-1	-1	5 min	
12C	60	-1	-1	0	-1	-1	0	10 min	
B4C11	60	-1	-1	0	-1	-1	0	10 min	
B4C11	60	0	-1	-1	0	-1	-1	5 min	
B4C10	60	0	-1	-1	0	-1	-1	5 min	
B4C10	60	-1	-1	0	-1	-1	0	10 min	

### 0.1.6 Setting 6

- Set **HMS momentum** to **+1.26 GeV**.
- **SHMS angle: 10°**
- **SHMS momentum: +9.2 GeV**
- **HMS angle: 35°**
- **Trigger: SHMS/HMS PS3 (ELCLEAN) OR SHMS/HMS PS1 (3/4)**
- **Important note on the prescales:** All the other prescales that are NOT specified on each row at the Table 7 should be set to **-1**.
- **Prescale values are only estimated; adjust them on both SHMS and HMS Prescale GUIs accordingly to keep the rates below 4 kHz.**
- Take data with the SHMS and HMS simultaneously.

Table 7: CSB Studies at 35° - Setting 6 **SHMS S1X(1-5) and S2X(1-6) HV TURNED OFF**

Target	$I$ ( $\mu\text{A}$ )	HMS PS			SHMS PS			Est. Time	Done ?
		PS1	PS2	PS3	PS1	PS2	PS3		
B4C10	60	-1	-1	0	-1	-1	0	10 min	
B4C10	60	0	-1	-1	0	-1	-1	5 min	
B4C11	60	0	-1	-1	0	-1	-1	5 min	
B4C11	60	-1	-1	0	-1	-1	0	10 min	
12C	60	-1	-1	0	-1	-1	0	10 min	
12C	60	0	-1	-1	0	-1	-1	5 min	
40Ca	60	0	-1	-1	0	-1	-1	5 min	
40Ca	60	-1	-1	0	-1	-1	0	10 min	
9Be	60	-1	-1	0	-1	-1	0	10 min	
9Be	60	0	-1	-1	0	-1	-1	5 min	
Al dummy	40	0	-1	-1	0	-1	-1	5 min	
Al dummy	40	-1	-1	0	-1	-1	0	10 min	
LH2	60	-1	-1	0	-1	-1	0	10 min	
LH2	60	0	-1	-1	0	-1	-1	5 min	
LD2	60	0	-1	-1	0	-1	-1	5 min	
LD2	60	-1	-1	0	-1	-1	0	10 min	

- Total estimated time for section including the momentum and target changes: **14 hrs**. Estimated run times are with 100% efficiency.