

Beam and access control

1. Beam and access control

Beam and access control are managed via the X-terminal available in the control room of the CERF. The relevant commands necessary to switch the beam on and off, vary the beam intensity, giving access to the experimental cave where the copper target is installed, and closing the area to put the beam back on again, are given below. Note that the system mostly accepts only UPPER CASE.

- 1) To enter the control program (if not already in) from the “eanorth>” prompt, type RUN TREE.
- 2) The beam intensity is varied by collimators C3 and C5 (see below), by adjusting the JAWS (do not use SLIT). For example, to set C3 to ± 10 is done by the commands:

TUNE / SET / COLL / 3 / JAWS / -10 / 10

- 3) The access to the experimental cave is via door 126. Access is obtained through the commands:

ACCESS / DOOR / 126 / OPEN

Type in your name when the program asks for it. Wait until you get the message confirming that you have access. Go to the door, make sure that the light “ACCESS WITH KEY” is on, push the yellow button with a key on it, take the key for which the red diode lights up and use it to open the door (PRESS THE DOOR HANDLE SLOWLY).

For (obvious!) safety reasons, every person entering the zone MUST take one key and keep it until access is terminated.

When coming out of the zone, put the key back into the panel and turn it into its normal position. When the last person has finished, check that nobody is left in the zone, put back the last key and push the red button marked “END OF ACCESS”.

IMPORTANT. In the door, next to the handle, there is a round “pastille” with a dim red light in it, which should be pushed IN EMERGENCY CASES ONLY. Whenever this button is pushed, it requires an operator to come over and reset the emergency stop manually. This may cause significant loss of beam time.

- 4) To put the beam back on, the commands are:

ACCESS / DOOR / 126 / BEAM ON

Type in your name (you are responsible for persons left in the zone!) and wait until the beam comes back.

2. Control of beam intensity

There are nine collimators in the H6 beam line, C1, C2, C3, C5, C6, C8, C9, C10 and C11 (C4 and C7 are not operational). The beam intensity can essentially be adjusted by means of three of them, C3, C5 and C6. The influence of the collimator opening on the beam spot (size and shape) on the target was investigated during one of the runs in 1996 by taking radiographies of the beam with a 9x12 cm² Kodak X-OMAT film. It was found that while C5 affects the horizontal extension of the beam spot only slightly, C6 reduces the vertical extension strongly. C3, which is in principle used for momentum selection, also enlarges the spot horizontally, when fully open. The effect of collimator settings on the beam spot was again checked before the run of 13-20 August 1997. Large variations in the beam spot may affect the radiation field at the measurement positions. For a good reproducibility of the radiation field at the exposure locations, the size of the beam spot should not be changed too much. It was established that the best procedure is to set C6 at a sufficiently large (fixed) value and then control the beam intensity with C3 and C5. The most recent FLUKA results used as input data the actual beam profile experimentally determined.

The beam intensity should therefore only be adjusted by C3 and C5. The other collimators should be left set as follows:

C1 \pm 20
C2 \pm 20
C6 \pm 30
C8 \pm 45
C9 \pm 45
C10 \pm 48
C11 \pm 45

The status of the collimators can be reviewed by the commands:

STATUS / COLL

As explained in section B.1 above, the collimators are adjusted by the commands (e.g., to set C3 to \pm 10):

TUNE / SET / COLL / 3 / JAWS / -10 / 10

Table 5 gives the settings of collimators C3 and C5 and the corresponding beam intensity (PIC-counts), for a beam intensity on the T4 primary target (the target producing the secondary beam transported in the H6 beam line) of approximately 2.5×10^{12} particles/burst. The actual beam intensity incident on the CERN-EC copper target and measured by the PIC scales linearly with the intensity on the T4 target (which is shown pulse-by-pulse on the TV monitor installed in the control room of the experiment).

Note that collimator changes are slow, so be patient.

The above procedure gives a beam spot centred on the copper target and approximately square. As an example, with both C3 and C5 set at \pm 15, the beam spot is 3 cm horizontally and 2 cm vertically.

Table 5. Approximate beam intensity as a function of settings of collimators C3 and C5, for 2.5×10^{12} particles on the T4 production target.

C3	C5	PIC/burst
± 2	± 2	90
± 5	± 2	230
± 10	± 2	420
± 10	± 5	1100
± 10	± 10	2100
± 15	± 10	3200
± 15	± 15	4500
± 20	± 15	5500
± 20	± 20	6600
± 25	± 20	8000
± 25	± 25	8500
± 30	± 25	9300
± 30	± 30	9300