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HIE-ISOLDE - XT03

ALIGNMENT OF THE EDINBURGH NUCLEAR PHYSICS CHAMBER ON XT03 BEAM LINE

Measurement of November 2nd 2017

The EDMS document 1871481, containing this report can be found at the following address:
https://edms.cern.ch/document/1871481

1 GENERAL INTRODUCTION

On the demand of Peter BLACK, the alignment of the Edinburgh Nuclear Physics Chamber on XT03 beam line in HIE-ISOLDE hall took place on 2nd of November 2017.

2 LOCAL COORDINATE SYSTEM

- **Origin** :Focal point of XT03
- **X axis** : beam line, positive in the sense of the beam.
- **Y axis** : perpendicular to X axis in the horizontal plane, positive from XT03 towards XT02.
- **Z axis** : vertical, perpendicular to the XY plane, positive to the top.

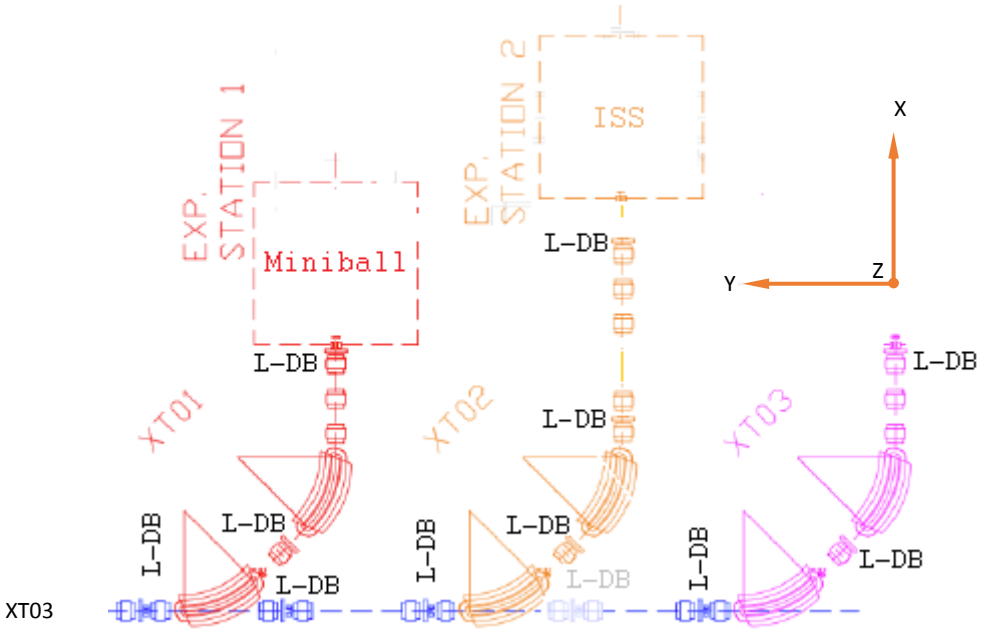

Figure 1 : Local coordinates system XT03

3 DISTRIBUTION OF THE MEASURED POINTS - SURVEY TARGET AND APPLIED ADAPTER

The Edinburgh Nuclear Physics Chamber has been adjusted with respect to the nominal beam line. The following parts have been measured:

- The entry and exit points of the chamber
- Both detectors inside the chamber
- The vertical target holder

In order to adjust the chamber with respect to the beam line, two points, entry and exit points, have been measured using a special adapter as shown in *Figure 5*.

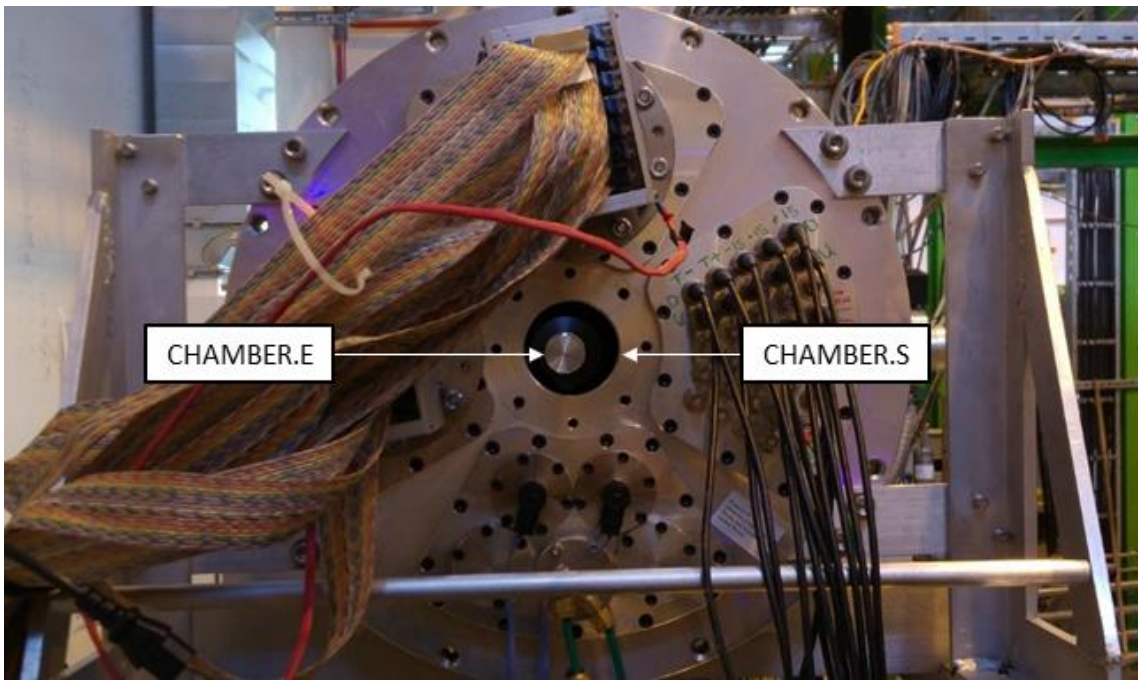

Figure 2 : Measured points on the chamber

A centre point on each detector inside the chamber has been measured to confirm the alignment using a special adapter as shown in *Figure 6*.

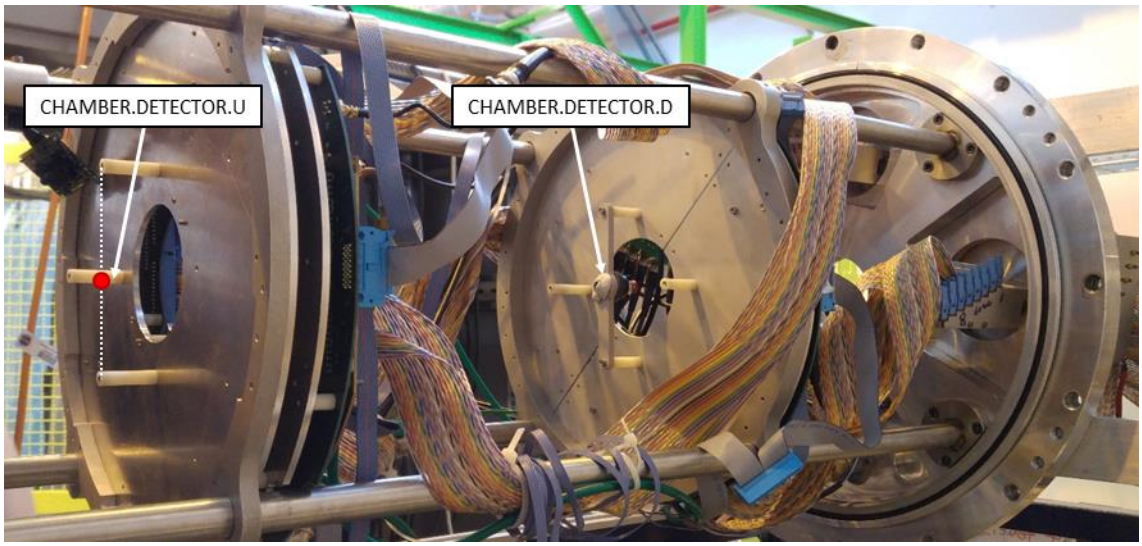

Figure 3 : Measured points on the detectors

The physics target holder has been adjusted to be at height=0m for the target CHAMBER.TARGET.TOP and afterwards for the target CHAMBER.TARGET.BOTTOM. For both positions the value of the manual height adjustment of the physics target holder has been noted.

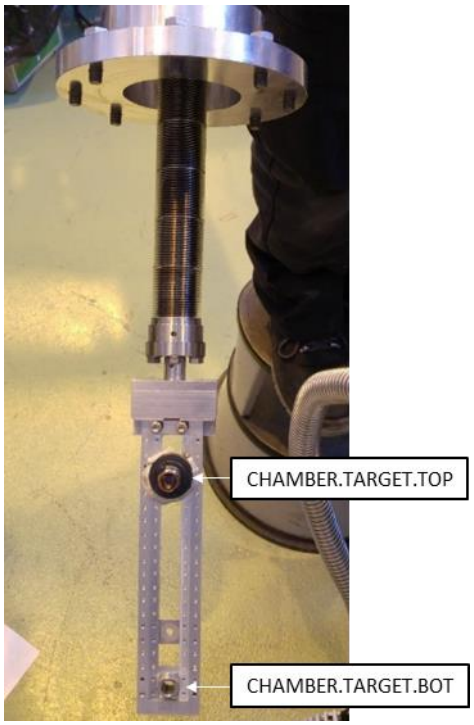

Figure 4 : Measured points on the target holder

All measured points include a target offset of 20mm with respect to the contact surface. The survey adapter has always been applied on the downstream side, this means the target offset can be corrected by subtracting 20mm to the X coordinates of the measured points.

The following *Figure 5* and *6* shows the adapters provided by Peter BLACK respectively used to measure the entry and exit points of the chamber and the centre points of the detectors.

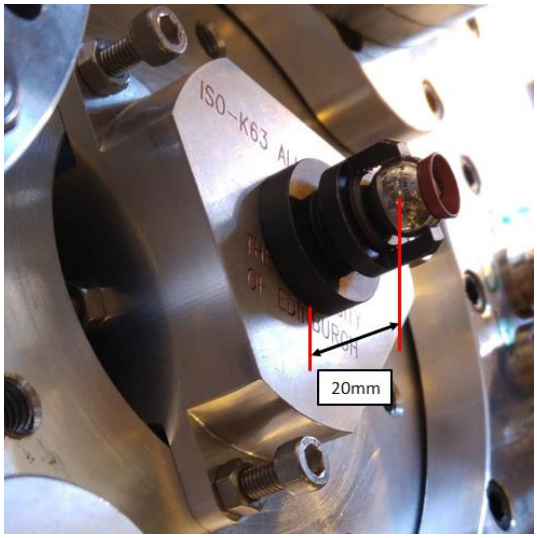

Figure 5 : Survey target and adapter used to measure points on the chamber

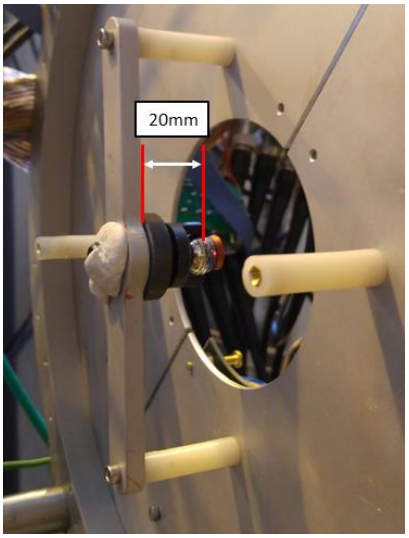

Figure 6 : Survey target and adapter used to measure points on the detectors

4 RESULTS OF THE MEASUREMENT

In the table below, results are given at the centre of survey target. Measured coordinates are given with precision 0.5mm at 1σ level in the coordinate system as described in §2.

HIE-ISOLDE - XT03 ALIGNMENT OF THE EDINGURGH NUCLEAR PHYSICS CHAMBER ON XT03 BEAM LINE November 02nd, 2017			
NAME	**X [m]**	**Y [m]**	**Z [m]**
Results of the first alignment			
CHAMBER.E_FirstAlign	1.4276	0.0006	-0.0004
CHAMBER.S_FirstAlign	2.3983	0.0008	0.0006
Results of the final alignment			
CHAMBER.DETECTOR.D	2.0602	0.0006	0.0008
CHAMBER.DETECTOR.U	1.6699	0.0004	-0.0001
CHAMBER.TARGET.TOP	1.6242	-0.0008	0.0003
CHAMBER.TARGET.BOTTOM	1.6218	0.0006	0.0000
CHAMBER.E_FinalAlign	1.4269	0.0011	0.0000
CHAMBER.S_FinalAlign	2.3974	0.0016	0.0015