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# ALICE – MFT

# FIDUCIALISATION OF THE MUON FORWARD TRACKER

Measurement of November 19th, 2020

The EDMS document **2450352**, containing this report can be found at the following address:
https://edms.cern.ch/document/2450352

# 1 GENERAL INTRODUCTION

On the demand of Stefano PANEBIANCO, the fiducialisation of the ITS Muon Forward Tracker (MFT) inside the clean room in B167 took place on November 19th, 2020.

The aim of the measurement was to determine the relative position of the MFT fiducial points.

# 2 COORDINATE SYSTEM

The coordinate system is based on the CAD coordinate system.

The coordinates of the MFT measured points have been undergone best-fit transformation with 6 degrees of freedom (3 rotations and 3 translations) with respect to the theoretical coordinates of the MFT points, extracted from CATIA.

The reference points for the best-fit transformations are the centres of the survey targets installed on the reference holes on the MFT disks using special adapters provided by Stefano PANEBIANCO.

The CAD coordinate system is defined as follows:

- **Origin**: IP point of ALICE experiment
- **Z-axis**: Coaxial to the theoretical beam line, positive from A side to C side.
- **X-axis**: Parallel to the normal of YZ plane, positive to the top.
- **Y-axis**: Perpendicular to X- and Z-axis, positive from O side to I side.

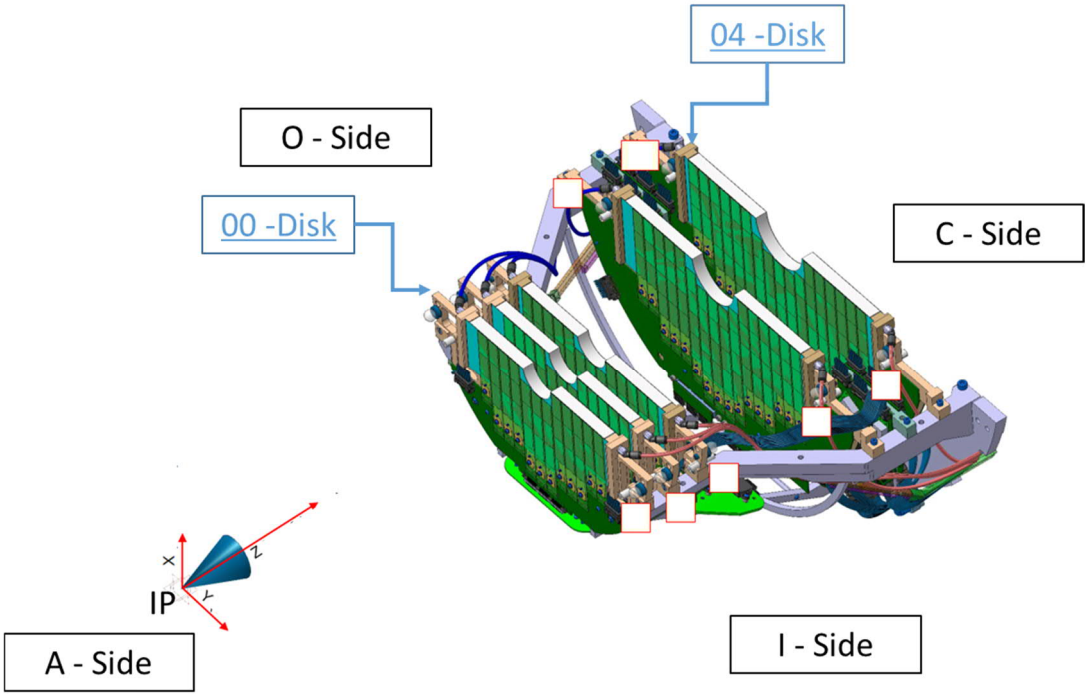


*Figure 1 : Definition of the coordinate system*

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

The Muon Forward Tracker consists of two half barrels, each containing five half disks.

In order to determine the geometry of the MFT, 20 fiducial points have been measured, two on each half disk.

These points are distributed as following:

- 10 fiducial points on the MFT bottom part
- 10 fiducial points on the MFT top part

The measured points have been named with the following abbreviations:

*{MFT}_({TOP or BOTTOM}_{YY}_{NN})*

| | |
|---|---|
| *{MFT}* | MFT for the measured fiducial points on the Muon Forward Tracker |
| *{BOTTOM or TOP}* | Bottom or Top part of the MFT, with respect to the beam line |
| *{YY}* | I/O to indicate the side of the measured fiducial point |
| *{NN}* | Number of the half disk from 00 up to 04.<br>(Numbering from A side to C side) |

The points have been measured with special 14mm offset survey adapters provided by Stefano PANEBIANCO and:

- Leica RFI 0.5inch prisms for the disks 00 and 03
- Leica RRR 0.5inch prisms for the disks 01, 02 and 04

The survey adapters and the prisms have been installed towards A side on all disks except for the disk 02 which has been measured on C side.

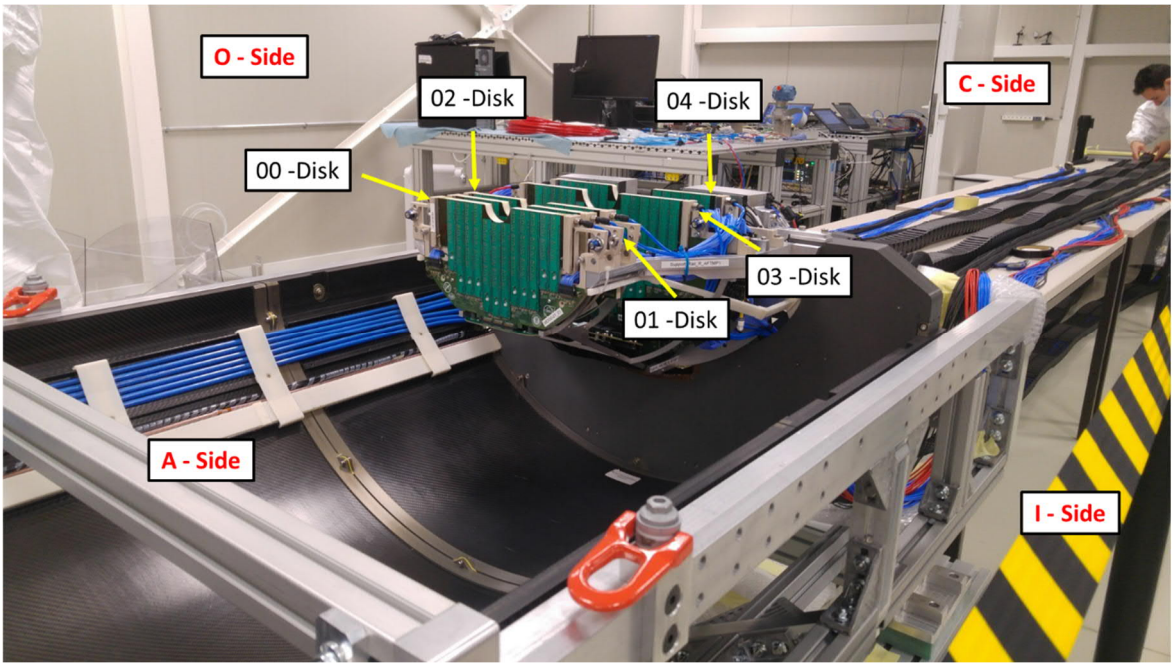


*Figure 2 : Bottom half disks of the Muon Forward Tracker*

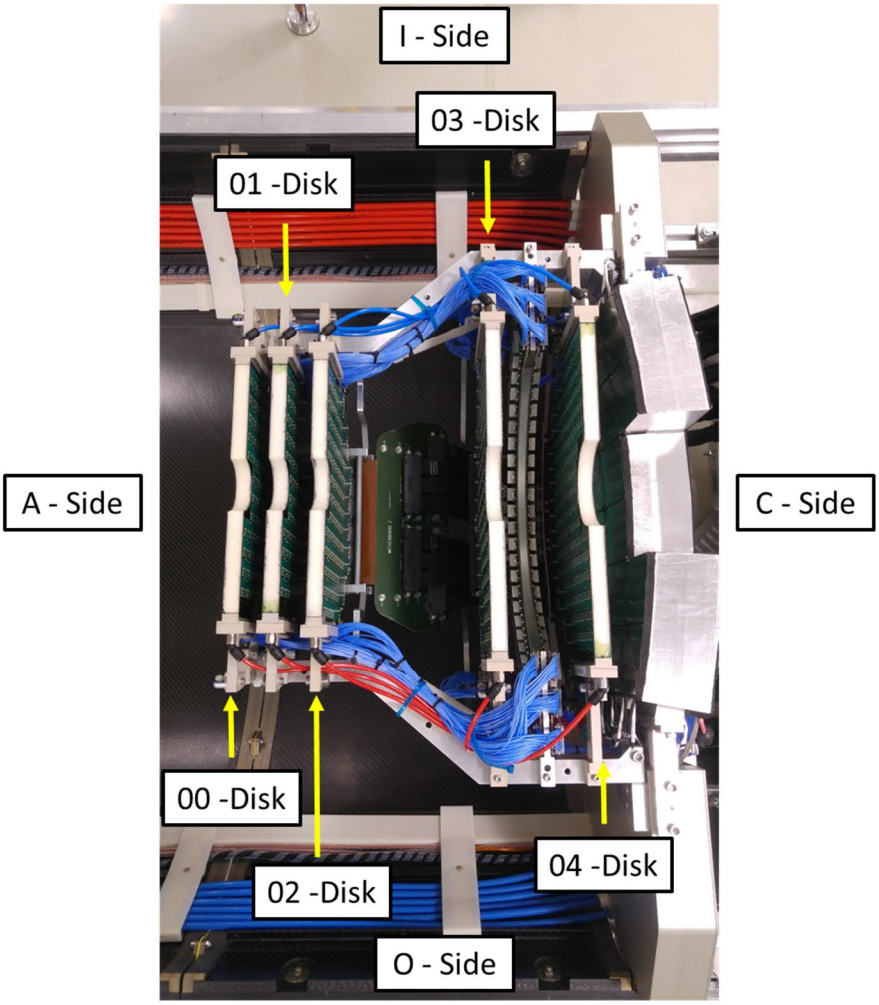


*Figure 3 : Top half disks of the Muon Forward Tracker*

# 4 RESULTS OF THE MEASUREMENT

In the table below, measured coordinates are given at the centre of the survey targets in the CAD coordinate system, as described in §2. Coordinates are given with precision 0.3mm at 1σ level.

ALICE - MFT
FIDUCIALISATION OF THE MUON FORWARD TRACKER
November 19th, 2020

| NAME | MEASURED POINTS | | | THEORETICAL COORDINATES | | | **Δ** = THEO. - MEAS. | | |
|---|---|---|---|---|---|---|---|---|---|
| | X [m] | Y [m] | Z [m] | X [m] | Y [m] | Z [m] | **Δ**X [mm] | **Δ**Y [mm] | **Δ**Z [mm] |
| MFT_BOTTOM_I_00 | -0.02996 | 0.16621 | 0.44560 | -0.03000 | 0.16600 | 0.44600 | 0.0 | -0.2 | 0.4 |
| MFT_BOTTOM_I_01 | -0.03004 | 0.16613 | 0.47881 | -0.03000 | 0.16600 | 0.47900 | 0.0 | -0.1 | 0.2 |
| MFT_BOTTOM_I_02 | -0.03033 | 0.16581 | 0.54354 | -0.03000 | 0.16600 | 0.54350 | 0.3 | 0.2 | 0.0 |
| MFT_BOTTOM_I_03 | -0.02973 | 0.17406 | 0.67019 | -0.03000 | 0.17400 | 0.67000 | -0.3 | -0.1 | -0.2 |
| MFT_BOTTOM_I_04 | -0.02995 | 0.17389 | 0.75400 | -0.03000 | 0.17400 | 0.75400 | -0.1 | 0.1 | 0.0 |
| MFT_BOTTOM_O_00 | -0.02991 | -0.16584 | 0.44607 | -0.03000 | -0.16600 | 0.44600 | -0.1 | -0.2 | -0.1 |
| MFT_BOTTOM_O_01 | -0.02980 | -0.16573 | 0.47900 | -0.03000 | -0.16600 | 0.47900 | -0.2 | -0.3 | 0.0 |
| MFT_BOTTOM_O_02 | -0.03020 | -0.16637 | 0.54368 | -0.03000 | -0.16600 | 0.54350 | 0.2 | 0.4 | -0.2 |
| MFT_BOTTOM_O_03 | -0.02992 | -0.17396 | 0.67015 | -0.03000 | -0.17400 | 0.67000 | -0.1 | 0.0 | -0.1 |
| MFT_BOTTOM_O_04 | -0.03015 | -0.17420 | 0.75395 | -0.03000 | -0.17400 | 0.75400 | 0.2 | 0.2 | 0.0 |
| MFT_TOP_I_00 | 0.02982 | 0.16584 | 0.44591 | 0.03000 | 0.16600 | 0.44600 | 0.2 | 0.2 | 0.1 |
| MFT_TOP_I_01 | 0.03019 | 0.16621 | 0.47900 | 0.03000 | 0.16600 | 0.47900 | -0.2 | -0.2 | 0.0 |
| MFT_TOP_I_02 | 0.03014 | 0.16641 | 0.54351 | 0.03000 | 0.16600 | 0.54350 | -0.1 | -0.4 | 0.0 |
| MFT_TOP_I_03 | 0.02982 | 0.17412 | 0.66990 | 0.03000 | 0.17400 | 0.67000 | 0.2 | -0.1 | 0.1 |
| MFT_TOP_I_04 | 0.03003 | 0.17388 | 0.75417 | 0.03000 | 0.17400 | 0.75400 | 0.0 | 0.1 | -0.2 |
| MFT_TOP_O_00 | 0.02995 | -0.16621 | 0.44607 | 0.03000 | -0.16600 | 0.44600 | 0.0 | 0.2 | -0.1 |
| MFT_TOP_O_01 | 0.02997 | -0.16617 | 0.47895 | 0.03000 | -0.16600 | 0.47900 | 0.0 | 0.2 | 0.1 |
| MFT_TOP_O_02 | 0.03011 | -0.16588 | 0.54365 | 0.03000 | -0.16600 | 0.54350 | -0.1 | -0.1 | -0.1 |
| MFT_TOP_O_03 | 0.02989 | -0.17419 | 0.66980 | 0.03000 | -0.17400 | 0.67000 | 0.1 | 0.2 | 0.2 |
| MFT_TOP_O_04 | 0.03008 | -0.17401 | 0.75405 | 0.03000 | -0.17400 | 0.75400 | -0.1 | 0.0 | 0.0 |