

Tracker Online Operations Procedure

Schematic of System

The layout of the MICE tracker is shown in figure 1. The five stations are held in position using a carbon-fibre space-frame. The distance between neighbouring stations is such that each nearest-neighbour spacing is unique. This ensures that the azimuthal rotation of track position from one station to the next differs, this difference being important in resolving ambiguities at the pattern-recognition stage.

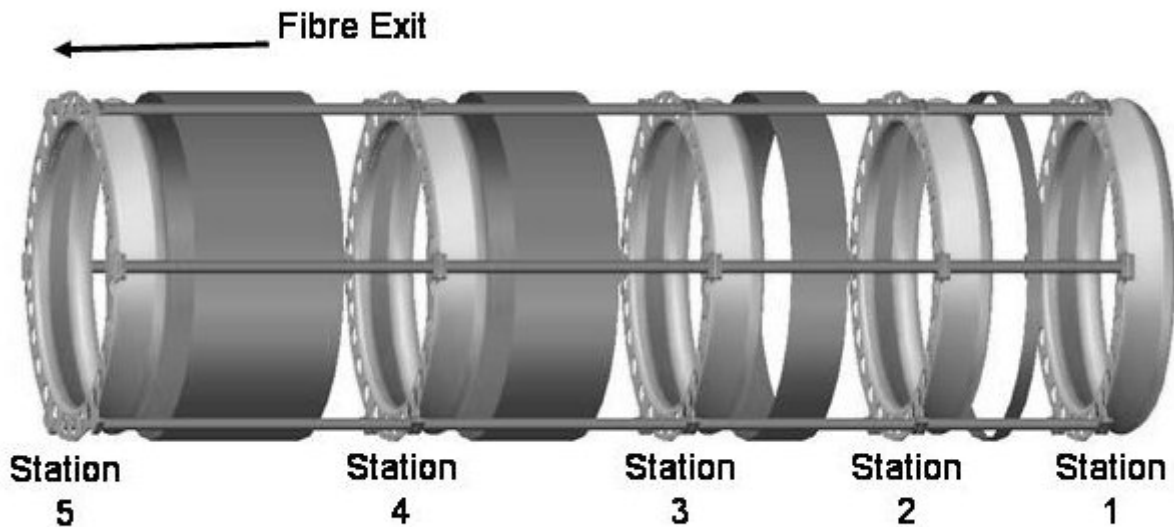


Figure 1. Schematic diagram of the MICE tracker. The five stations are shown supported by the carbon-fibrespace frame, with fibres omitted for clarity. The station numbering scheme is indicated together with the direction in which the clear-fibre light-guides leave the tracking volume.

Each station consists of three ‘doublet layers’ of 350 μm scintillating fibres glued on a carbon-fibre station body. The doublet layers are arranged such that the fibres in one layer run at an angle of 120 degrees to the fibres in each of the other layers as shown in figure 2a. The arrangement of the fibres within a doublet layer is shown in figure 2b. This packing arrangement ensures that there are no inactive regions between adjacent fibres. The configuration of the seven fibres ganged for readout via a single clear-fibre light-guide is also indicated in figure 2b. The performance of the tracker is determined by the light yield and the fibre pitch. The seven-fold ganging (see figure 3b), combined with a fibre pitch of 427 μm (see table 1), yields an expected spatial resolution per doublet layer of 470 μm . The expected light yield was estimated by extrapolating that obtained in the DØ fibre tracker which used 835 μm scintillating fibres with similar dopant concentrations. Taking into account the scintillating-fibre diameter used in MICE (350 μm) and assuming a maximum clear-fibre light-guide length of 4 m, a light yield of ~ 10 photo-electrons is obtained.

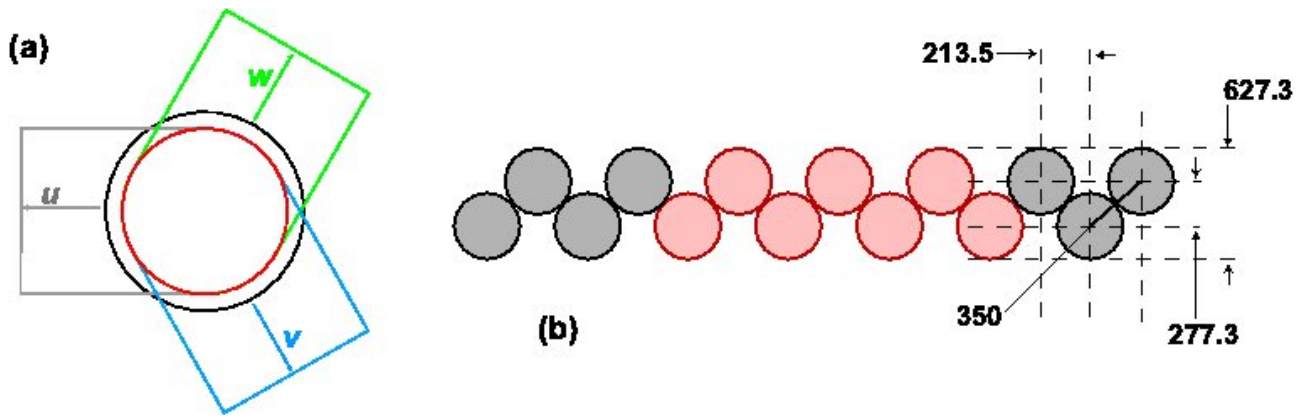


Figure 2: (a) Arrangement of the doublet layers in the scintillating-fibre stations. The outer circle shows the solenoid bore while the inner circle shows the limit of the active area of the tracker. The grey, blue, and green arrows indicate the direction that individual $350 \mu\text{m}$ fibres run in the u , v , and w planes respectively. (b) Detail of the arrangement of the scintillating fibres in a doublet layer. The fibre spacing and the fibre pitch are indicated on the right-hand end of the figure in μm . The pattern of seven fibres ganged for readout in a single clear-fibre light-guide is shown in red.

1. Power Up

Under development - This is the responsibility of the Tracker expert

1.1 Instructions to Shifters: Power Up

1.2 Checklist to Follow At Power On

2. Operation

2.1 Instructions to Shifters: How to Operate and Monitor the System

- ongoing consider post Mock Data Challenge

3. Safety

- **If the system shuts down do not restart Tracker expert only.**
- Power outage is the greatest risk to the Tracker: cryostat will stay cold lid will be cold and moisture will get on electronics. - If this happens run lid heater boxes of UPS.

3.1 Emergency shutdown Procedure

- Turn off veners
- Isolate cryostat vacuum
- Turn off pumps
- Turn off compressors.

3.2 Items That Require Regular Maintenance and Safety Checks

- Cryostats
- Cold heads
- Helium bottles