

Project title: SciFi-Tracker
Partner: I. Physikalisches Inst. B RWTH Aachen University
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Mission Statement

The Standard Model of particle physics describes the physics of the smallest particles with outstanding precision. The discovery of the Higgs boson has experimentally confirmed the last missing building block of the theories. However, many fundamental questions remain open, such as the nature of dark matter. To answer these and other questions in the future, experiments to measure the particles at the Large Hadron Collider (LHC) storage ring at CERN are necessary, among other things. In addition to the already 360 m² sensitive area of the detector, the track detector of the LHCb experiment requires a higher granularity due to the increased particle density. For this purpose, new types of scintillating fibre trackers (SciFi trackers) will be used.

Approach

For the LHCb experiment, a SciFi tracker with a sensitive area of 360 m² was developed with modules consisting of scintillating fibres with a filament diameter of 250 µm, with which a spatial resolution of 60 µm was achieved. To achieve a higher spatial resolution of 10-20 µm, the fibre diameter has to be reduced to 125 µm. The manufacturing time for these new fibre modules would quadruple to 12.6 years with the current production process and would therefore not be feasible. Therefore, a new, more efficient production technology for the scintillating fibre detectors is being developed in the present research project.

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