

Trainee's Project Report

Job Code	PH1983
Department	PH
Discipline	Materials Science
Supervisor	PETAGNA Paolo

Description

Materials for on-detector Thermal Management of future Trackers.

The Detector Technologies group of the Physics Department (PH-DT) has received the mandate of dealing with cooling issues related to the next generation of particle detectors, with special emphasis on complex Trackers. Within this group we offer an opportunity to a young, highly motivated material engineer to play a role in the enhancement of the local thermal management of the future tracking detectors. Many tens of kW dissipated by millions of electronic channels distributed in a confined volume with controlled atmosphere are the most apparent thermal characteristics of present and future tracking detectors. One has to add to this the need of minimal mass coupled to the need of very high space and time stability in an environment operated at temperatures below 0 °C. An efficient and well integrated thermal management of the heat locally produced by the detector electronic is one of the key features of a detector designed for success.

Starting from the recollection and critical analysis of the main solutions adopted by the responsible sub-detector engineers of the existing LHC Trackers, the Trainee will conduct a systematic study of the materials adopted for thermal contacts and for structural components with important thermal roles (either conductive or insulating). In parallel he will pursue an investigation on the up-to-date materials available for thermal management (both for structural and for non-structural components), possibly including materials involving new technologies, like those based on Carbon Nano-Tubes. The Trainee will be part of a very motivated team and will be supervised by senior engineers. He will work in collaboration with specialized laboratories for chemical and thermo-mechanical properties both from CERN and from external collaborating institutes. The work will include an important analysis of the impact of high irradiation doses on the thermo-mechanical properties of the candidate materials.

Special Requirements

University Degree in Material Science, or Mechanical Engineering with a strong background in materials. Good level of English required.

Training Value



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Thermal management materials at the forefront of present technology. Follow-up and analysis of thermo-mechanical tests. Definition of irradiation protocols and analysis of the impact of irradiation on the properties of materials. Team work in an international environment

