



# Analysis and testing of a cooling layout for the new High Granularity Calorimeter (HGCal) for the CMS detector

Code	EP7564
Programme	FCT
Department	EP
Responsible	33762 - Dr. Duccio Abbaneo
Title	
Analysis and testing of a cooling layout for the new High Granularity Calorimeter (HGCal) for the CMS detector	
Description	
<p>For the High Luminosity operation of the LHC, CMS will replace the endcap calorimeters, which covers the region <math>1.5 &lt; \eta &lt; 3.0</math> with a new High Granularity Calorimeter. The proposed design includes a silicon/tungsten electromagnetic calorimeter frontal section, followed by a hadronic section. The electromagnetic section read out is based on silicon sensors, while the hadronic section read out is based on a combination of silicon sensors and scintillators. The absorber materials consist on copper and stainless steel plates of different thicknesses. These new endcaps will weigh about 200 tons each and will be cooled to -30 C with a CO<sub>2</sub> based cooling system.</p> <p>The trainee will analyse a cooling strategy in order to minimize the number of piping connections. This study will involve analytical calculation regarding mainly the thermal contact resistance between metallic plates and find the right set of parameters in order to minimize the temperature gradients through the contact. After carrying out the analysis, the trainee will design and follow the construction of a test setup in order to validate his conclusions.</p>	
Skills	
<p>Mechanical Engineering: Computer integrated/aided design, Heat Transfer, Numerical techniques and software (e.g. ANSYS, Abaqus...)</p> <p>The trainee should master heat transfer calculations and be very familiar with numerical mechanics and software analysis tools (Ansys).</p> <p>A familiarity with engineering design using CAD software (CATIA in particular), instrumentation hardware and data taking would be an asset.</p>	
Disciplines	
Mechanical Engineering	

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