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# EuroCirCol

European Circular Energy-Frontier Collider Study

Horizon 2020 Research and Innovation Framework Programme, Research and Innovation Action

## MEETING MINUTES

## SPECIAL MEETING

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<b>Document identifier:</b>	EuroCirCol-P1-WP5-MIN-16122015
<b>Date and time:</b>	2015-12-16
<b>Place:</b>	CERN, Preveessin, France
<b>Work package:</b>	WP5
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<b>Participants:</b>	Amalia Ballarino, Bernardo Bordini, Luca Bottura, Maria Durante, Paolo Ferracin, Susana Izquierdo Bermudez, Glyn Kirby, Friedrich Lackner, Clement Lorin, Rafal Ortwein, Juan-Carlos Perez, Etienne Rauchepault, Gijs De Rijk, Frederic Savary, Daniel Schoerling (Scientific Secretary), Ezio Todesco, Davide Tommasini (Chair), Giovanni Volpini; <u>Video:</u> Tiina Salmi, Daniel Schulte, Antti Stenvall, Fernando Toral
<b>Link to Indico:</b>	<a href="https://indico.cern.ch/e/464602">https://indico.cern.ch/e/464602</a>

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## Executive summary

- The splice management & layout will not be discussed for the 2D design options.
- The baseline remains to power the magnets with one power supplier. Using two power supplies can be studied as an additional option to the baseline.
- The baseline temperature is adjusted from 4.5 K to 4.2 K. The margin is kept at 10%.
- The minimum Cu/Non-Cu ratio is kept at 1:1.
- Replacing some of the conductors with pure Cu strands to save cost and increase the available amount of Cu for protection might be an option and may be studied at a later stage.
- A conductor mass of around 10,000 t (Cu + Non-Cu) is assumed as target value. For this calculation a total number of 4578 units with a length of 14.3 m, and a conductor density of 8.7 kg/dm<sup>3</sup> is set.
- The detection + reaction time for quench protection is fixed at 40 ms.

## S. Izquierdo Bermudez: Overview of grading considerations at CERN for a 16T Dipole (Block type coil configuration)

CERN plans to build, first an Enhanced Racetrack Model Magnet (ERMC) and second a Racetrack Model Magnet (RMM), and third a demonstrator. The ERMC/RMM construction is further staged: first coils without grading and then coils with grading will be built. The mechanical design is made to reach up to 18 T before the coil is unloaded. Half of the pre-stress at cold will come from the bladder-and-key and half from the shell (80 MPa each).

Different types of grading were presented and discussed with quantitative examples, as well as splicing (both the possible techniques and layouts).

It was commonly agreed that high-field Nb<sub>3</sub>Sn splicing is an essential technology development for the 16 T dipole magnets and shall be performed in the framework of the FCC technology companion development.

## C. Lorin: ECC

C. Lorin presented different graded block coil designs reaching the target values. He evidenced as a reference temperature of 4.5 K poses large challenges on achieving the set cost targets. After a discussion it was agreed to set the reference temperature for the WP5 at 4.2 K, 10% margin.

Following, C. Lorin presented several ideas for the splicing layout. It was finally agreed that for the review in spring 2016 the designs will not enter into the detail of the splice position.

This issue will be studied in detail during the next step of the design process (3D design).