



Future Circular Collider

**PUBLICATION**

# High-field accelerator dipole conceptual design report: Milestone M5.4

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01 April 2019



The European Circular Energy-Frontier Collider Study (EuroCirCol) project has received funding from the European Union's Horizon 2020 research and innovation programme under grant No 654305. The information herein only reflects the views of its authors and the European Commission is not responsible for any use that may be made of the information.



The research leading to this document is part of the Future Circular Collider Study

The electronic version of this FCC Publication is available on the CERN Document Server at the following URL :

<http://cds.cern.ch/record/2669315>

Grant Agreement No: 654305

# EuroCirCol

**European Circular Energy-Frontier Collider Study**

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

## MILESTONE REPORT

# HIGH-FIELD ACCELERATOR DIPOLE CONCEPTUAL DESIGN REPORT

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<b>Document identifier:</b>	EuroCirCol-P3-WP5-M5.4 EDMS 2041694
<b>Due date:</b>	End of Month 46 (April 1, 2019)
<b>Report release date:</b>	28/03/2019
<b>Work package:</b>	WP5 (High-field accelerator magnet design)
<b>Lead beneficiary:</b>	CERN
<b>Document status:</b>	RELEASED (V1.0)

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**Abstract:**

This milestone marks the consolidated design work consisting of drawings, functional and performance specifications for a dipole model sufficiently long (~1.5 m) to make relevant qualification measurements on performance, field quality and protection in a follow-up project.

The design folder corresponding to this milestone has been published in deliverable D5.4.

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**Delivery Slip**

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<b>Approved by</b>	EuroCirCol Coordination Committee		28/03/19

The design work concerning conceptual reference designs for up to 16 Tesla strong particle collider superconducting dipole magnets based on Nb<sub>3</sub>Sn superconductor has been successfully launched in this project. Deliverable D5.4 reports on the design folder of one of these magnets, the US designed model magnet. The requirements for this milestone, to achieve a conceptual design have been exceeded: In addition to the description of the magnet, the parts for the model have been ordered and the magnet is currently being assembled at Fermilab in the US.

In addition, further, alternative designs have been pursued with other institutes:

- CEA in France,
- INFN in Italy,
- BINP in Russia,
- CIEMAT in Spain and
- PSI in Switzerland.

These additional activities were not foreseen originally in the EuroCirCol program, but have been launched and coordinated by CERN, leveraging matching resources of the international organisation and national fundings in the member states.

Thanks to a number of novel concepts introduced in the different designs, all design options are considered complementary with diverse potentials. The design activity is described in greater detail in the FCC Conceptual Design Report, Volume 3, Section 3 (Openly accessible at the CERN Document Server at <https://cds.cern.ch/record/2651300>).

The “preferred design option”, the cosinetheta design, currently being built by the US Department for Energy (DOE) collaboration partners Fermilab (FNAL) and Lawrence Berkeley National Laboratory (LBNL) will be tested under operating conditions in 2019.