

FCC International Advisory Committee

Final statement on the FCC CDRs

Jan 15, 2019

The International Advisory Committee (IAC)¹ for the Future Circular Collider (FCC) study has followed the activities of the FCC study group during the years 2017-2018, according to its mandate given by the FCC Steering Committee. This mandate consisted in reviewing the scientific and technical progress and considering, for each of the numerous FCC study areas, the following questions related to the readiness level required for a Conceptual Design Report (CDR):

- (a) Completeness and homogeneity of study details;
- (b) Outstanding issues of high priority and show-stoppers;
- (c) Items which require further clarification;
- (d) Errors or oversights;
- (e) Suggestions for additional options or alternative approaches and
- (f) Comment on the proposed CDR structure and possibly suggest improvements, also in terms of presentation strategy, clarity and coherence.

Importantly, since cost estimates have not been provided to the IAC prior to the CDR submission, the IAC has not been in a position to comment on those; however, the committee has made suggestions in terms of guidelines and good practices towards arriving at such cost estimates.

In order to fulfil its mandate, the IAC has organized three comprehensive review meetings (29-30 June 2017; 17-18 May 2018; 10 Sep 2018). While the third meeting entirely focused on the status of the preliminary CDR documents, during the first two of these meetings the presenters were asked to focus on the main aspects and critical items of the specific sub-projects, and to address questions such as (i) Is there a challenge/risk register? (ii) Are there show-stoppers? (iii) What are the most relevant interfaces with other parts of the project? How are these taken into consideration? (iv) What is the sensitivity in terms of cost when changes to the baseline would be applied? Are such cost sensitivity analyses carried out?

As a follow-up, the IAC provided reports with comments and recommendations, structured according to: 1. Physics Case, 2. Machine aspects, 3. Detector Designs, 4. Civil Engineering, 5. Infrastructure, Integration and Energy, 6. 16T Magnet R&D, 7. Superconducting RF R&D, 8. Overall Schedule, 9. CDR Table of Contents and 10. Main critical aspects and possible show-stoppers.

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In the following, we summarize the main comments and recommendations that resulted from this entire process:

The IAC would like to thank the FCC coordination group and its collaborators for the excellent preparation of the review meetings and the presentations there, as well as for the very collaborative and constructive spirit shown in the discussions.

The IAC congratulates the FCC study group for the continued impressive progress made during these recent years that, besides during the IAC review meetings, could also be appreciated in the context of the FCC Weeks organized in Rome (2016), Berlin (2017) and Amsterdam (2018).

The IAC commends the FCC study group for having successfully achieved a major milestone, namely the timely delivery of four CDR Volumes (FCC-Physics, FCC-ee, FCC-hh, HE-LHC) that will serve as truly important input for the European Strategy for Particle Physics Update.

The IAC considers the material presented in the CDRs, in terms of level of detail and comprehensiveness, to be at an adequate level for the current project stage and to represent an important basis for the ensuing R&D efforts.

The IAC concludes that the overall package presented by the FCC study group as “Integrated Programme (FCC-int)” to the European Strategy for Particle Physics Update, namely a staged approach of the ee and pp options (with a possible ep add-on), represents a convincing, visionary and technically feasible answer to the challenges and questions posed by the current high-energy physics landscape.

The IAC recommends that the ongoing and future developments be accompanied by a risk registry, focusing on timelines, performance and cost, with particular attention given to the high-field magnet developments in the case of the hadron machines.

The IAC notes that significant additional resources will be needed in the next project phase, and so streamlining and resource optimizations are mandatory. This applies in particular if different optimization studies continue to be pursued in parallel for the various machine proposals.