Meeting Minutes of the
144th FCC-ee optics design meeting and 15th FCCIS WP2.2 meeting

Indico: https://indico.cern.ch/event/1065778/
When: 16.09.2021 14:30-16:30 CET

Agenda

Presenter	Title
J. Gutleber	**Reference layout and placement baseline PA31-1.0**
K. Hanke	**Placement of the two RF points**
N. Nikolopoulos	**SR heat load on cold SSS**

1 General information

F. Zimmermann opens the meeting by welcoming the newcomers. **A. Faus-Golfe** introduces **H. Jiang**, a new post-doc at IJCLab working on monochromatization in FCC-ee.

Regarding general information, in the week of the meeting, the first FCCIS Collaboration Board (CB) meeting took place. A second CB meeting will take place in October, where the CB chair will be elected. The chair will then also serve as part of the international steering committee.

F. Zimmermann also mentions a recent presentation by **A. Blondel** at NuFact 2021 on FCC as a heavy neutrino factory.

2 Reference layout and placement baseline PA31-1.0

J. Gutleber presents the new FCC baseline tunnel layout and parameters, together with two fallback solutions. Participants of the meeting are reminded that the information in this presentation, in particular the detailed location of surface sites, is strictly **confidential** and should only be shared within the project and on a need-to-know basis. Using the automatic tunnel optimisation tool and using 90 km as the lowest acceptable tunnel circumference, the baseline solution PA31-1.0 was found, where 6 out of 8 access points are in generally favourable locations. Two fallback scenarios 1.1 and 1.6 have been developed, and all three layouts feature a circumference of about 91 km. Compared to the previous layout, the straight section length for some points has changed. The former Long Straight Sections PD and PJ have been shortened to 1.4 km, whereas the straight sections in PB, PF, PH, and PL have been extended from 1.4 km to 2.16 km. The impact of tilts up to 1 % along the axis PD to PJ on the shaft depths have been studied and two options with 0.4 and 0.6 % are kept for now. The potential locations of surface sites for each point are presented, with emphasis on the available space there and potential implications on which systems could be installed.

M. Koratzinos asks why the maximum tilt was limited to 1 %. **K. Hanke** replies that this number was chosen due to safety concerns.

M. Koratzinos also adds that due to the shorter arcs, luminosity should decrease by about 5 % and RF voltage will have to be increased.

3 Placement of the two RF points

Based on the new layout, **K. Hanke** presents considerations on possible locations for the RF. There, constraints arise from the need to install the cryo plants on the surface, while taking into account the available space, terrain, existing infrastructure, and potential noise disturbance to neighbouring houses. Preliminary analysis shows that the long straight sections PB and PF are not suitable for the installation of the RF, while PL is in principle feasible, but comes with severe constraints on the surface installations. Suitable sites would be PH, PD, and PJ, the latter two points only available in the case of a design with 2 experiments.

On the layout of the RF in FCC-ee, **A. Blondel** presents the case from the view of the particle physics experiments. To avoid any additional uncertainty on the center-of-mass energy in the Z and W operation mode, as well as to enable direct $e^+e^- \to H$ experiments, the acceleration for both beams should take place in one insertion only. For the case where the RF for the positron and electron beam cannot be located in the same insertion, no interaction point should be located between them (or in the diametrically opposed insertion) to avoid different center-of-mass energies between all four experiments.

K. Oide comments that problems with the chromaticity correction might arise if the RF is placed after the IP and before the arc as well as in the case of non periodic placing of the RF.

F. Zimmermann also raises the issue that for the single RF points, with all the power concentrated there, a later splitting might leave unused resources there and might not be the preferred solution from the technical implementation point of view. He also adds that the RF for the booster ring should be considered in this discussion.

4 SR heat load on cold SSS

N. Nikolopoulos' presentation revisits an issue raised by **M. Koratzinos** in the 141st FCC-ee optics meeting. There, the heat in a short straight section cryostat coming from SR impacting on the upstream photon stopper was evaluated, however, a simpler model was used as the exact CAD model could not be imported into FLUKA. After a brief introduction of different approaches to solve this issue, the workflow using DAGMC tools as well as the CAD model geometry is described in detail. After the translation and highlighting some potential issues during the conversion, five cases were studied, each differing in either the absorber or cryostat material. For the optimal case with full shielding, only 1 ‰ of the incident SR energy is deposited in the Dewar, corresponding to less than 1 W.

F. Zimmermann asks what the cooling capacity is. **M. Koratzinos** replies that to his knowledge it is around 20 W.

R. Kersevan comments that cooling channels in the tungsten should be added, as other cooling solution may lead to a temperature increase and subsequent increase of outgassing.

Follow-up items

TASK
Adapt FCC-ee lattices to new geometry
Decide on number, location(-s) of RF points, and staging for the different operation modes

45 Participants:

A. Abramov, I. Agapov, J. Bauche, M. Benedikt, A. Blondel, A. Bogomyagkov, M. Boscolo, H. Burkhardt, P. Burrows, F. Carlier, Y.-C. Chae, T. Charles, B. Dalena, A. Faus-Golfe, F. Francesini, J. Gutleber, H. de Grandsaignes d'Hauterives, K. Hanke, M. Hofer, B. Humann, P. Janot, H. Jiang, I. Karpov, J. Keintzel, R. Kersevan, P. Kicsiny, M. Koratzinos, V. Mertens, M. Migliorati, N. Mirian, N. Nikolopoulos, K. Oide, T. Pieloni, F. Poirier, A. Rajabi, R. Ramjiawan, L. van Riesen-Haupt, G. Roy, D. Shatilov, R. Wanzenberg, J. Wenninger, F. Yaman, R. Yang, Y. Zhang, and F. Zimmermann