MDI Tasks in next Phase and progress since last Dec.

- BIB Study
  - Validation of the tools(Guinea-Pig for PP, BDSIM for SR, and our own toolkit for single), using the exactly same code to simulate the BESIII case and the CEPC case.
    - The cross-section calculation of the Pair-Production using Guinea-Pig has been performed. Alternative codes like Wrap-X is implementing, together with the LEP data verification. On-going efforts in GP related issues.
    - The SR estimation using BDSIM shows the consistent results with Ref-TDR using the same assumption(for VTX only). We are extending to upper limit of the beam distribution from 10 sigma to 30 sigma with lager ratio(calculating according to the beam lifetime).
    - The codes used for single BG estimation has been compared and also adopted to APES.
  - Continue the BIB study at BESIII, including more dedicated BIB studies at BEPCII-U(applied for this summer, IDRC)
    - The data taken on 2024 has also been analyzed. We got more reliable results using more data in 2021 and 2024.
    - Something strange has been found with the 2021 data has been found with beam-gas. Analyzing the reason.
    - The on-going work at BEPCII-CW.
  - Updates of the BIB levels in all operation modes, starting from Higgs, and include the offsets and errors.
    - Estimating the single BIB level using EDR design(no corrections, with solenoids). The collimators and masks will be updated later.
  - Other modes and optimization of the IR design.

MDI Tasks in next Phase and progress since last Dec.

- MDI Study (with accelerator and mechanical group)
  - Updates of the IR Layout and the corresponding parameters(heat load, etc) based on the latest EDR design of the accelerator(Together with accelerator colleagues, IDRC), followed by the possible optimization.
    - Updating the heat load calculation using the latest EDR design of the accelerator.
    - More detail in design including the auxiliary support, the design of the flange, have been discussed.
  - Feasibility study of the mechanical issues, including the technique studies on manufacture and mockup(corrosion, welding, Au-coating…)
    - Visited 905 late May. More information will be provided later in coming weeks, maybe also in mechanical talk.
    - Visted the INFN-LNF last week to see their mockup progress. Would give a dedicated talk in the coming weeks.
- Luminosity Measurement Study
  - Study on diamond sensors used for Fast-Luminosity and Beam monitor(IDRC)
  - Study on Silicon Carbic sensors used for Fast-Luminosity and Beam monitor
    - Plan to use as dose monitor in the BIB experiment this year, together with the dosimeter.
  - Study on LYSO modules in BEPCII/BESIII
    - One of the first detector with CEPC design used in real experiment. Plan to finish construction this year.

Reminder: IDRC Recommendations

- The committee recommends continuing the study of discrepancies observed between data and simulation from BESIII. Understanding these differences is important for validating the assumptions underlying the CEPC machine–detector interface design.
- Closer collaboration with the accelerator team should be established to explore the full range of possible beam steering scenarios. This coordination is especially important for refining the design and placement of synchrotron radiation (SR) masks and collimators, ensuring that they remain effective across realistic operational conditions.
- The detailed mechanical design of the region surrounding the IP beam pipe should proceed as a priority, as its geometry and integration will directly impact the layout and feasibility of several adjacent components, including the luminosity monitors, final-focus magnets, and vertex detector. Early completion of this design will help prevent costly downstream revisions.
- The current description of the diamond-based Fast Lumi detector in the reference TDR lacks sufficient technical detail. The documentation should be expanded to include the detector architecture, segmentation, readout scheme, and performance expectations, supported by relevant prototype or test-beam results where available.