Status for the CEPC CDR

-TPC tracker

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On behalf of the tracker detector subgroup

2017/11/02

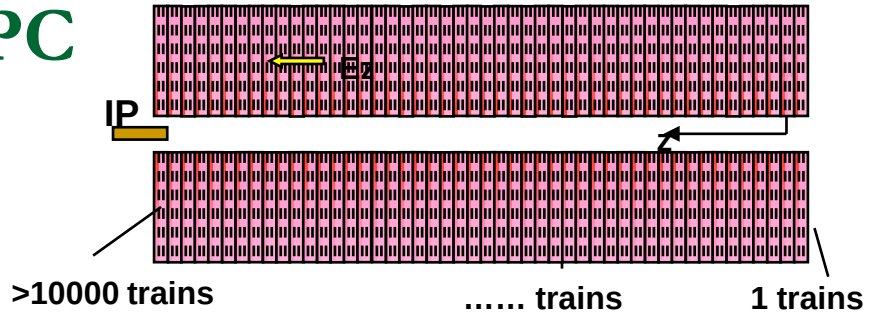
Outline

- Status of CDR document
- Posters for CEPC workshop

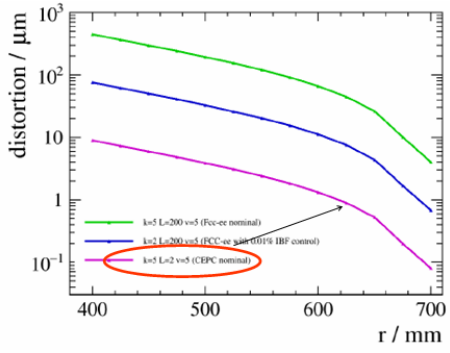
Technical challenges for TPC

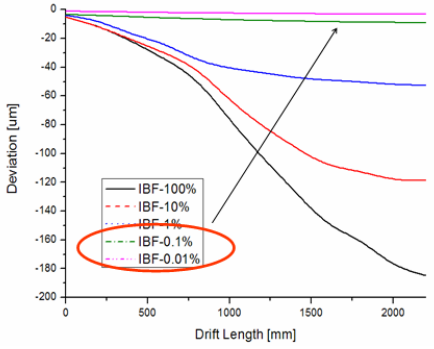
Ion Back Flow and Distortion :

- ~100 μm position resolution in rφ
- Distortions by the primary ions at CEPC are negligible
- More than 10000 discs co-exist and distorted the path of the seed electrons
- The ions have to be cleared during the ~us period continuously
- Continuous device for the ions
- Long working time



Amplification ions @CEPC

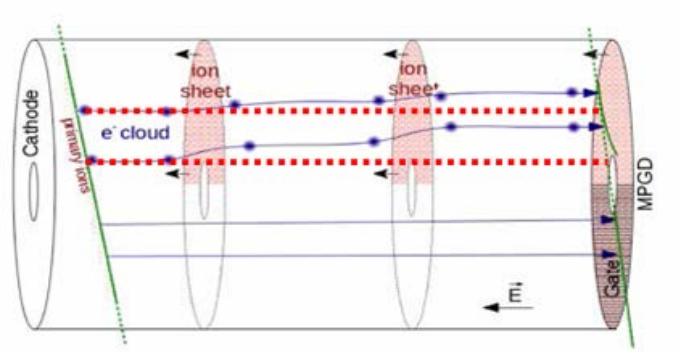




Evaluation of track distortions

Calibration and alignment:

- Systematics precision (<20 μm internal)
- Geometry and mechanic of chamber
- Modules and readout pads
- Track distortions due to space charge effects of positive ions

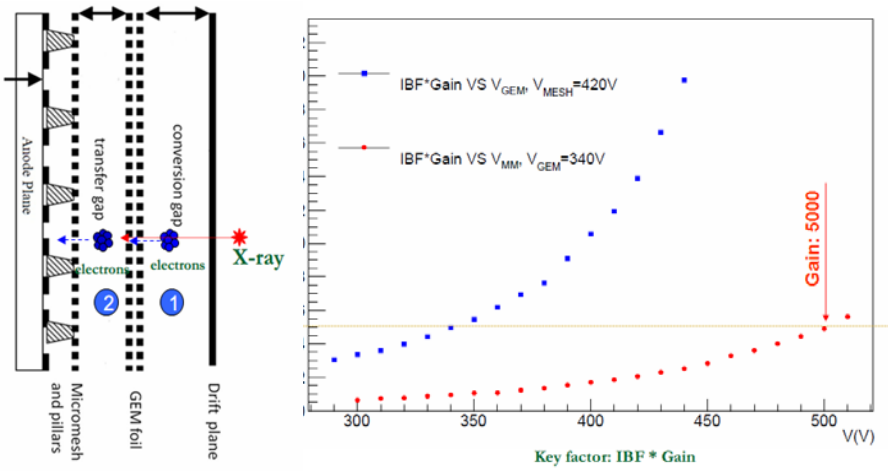


Ions backflow in drift volume for distortion

Options and feasibility

Continuous IBF module:

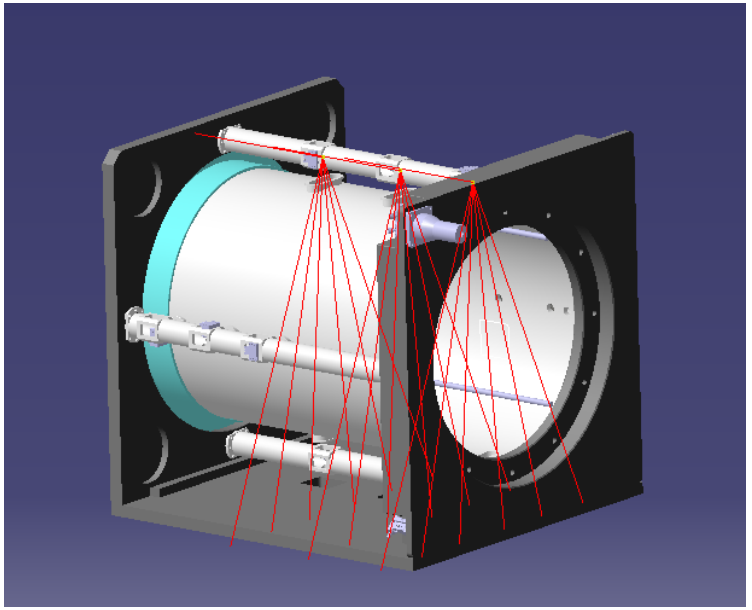
- Gating device may be used for Higgs run
- Open and close time of gating device for ions: ~ μs-ms
- No Gating device option for Z-pole run
- Continuous Ion Back Flow due to the continuous beam structure
- Low discharge and spark possibility



Continuous IBF prototype and IBF × Gain

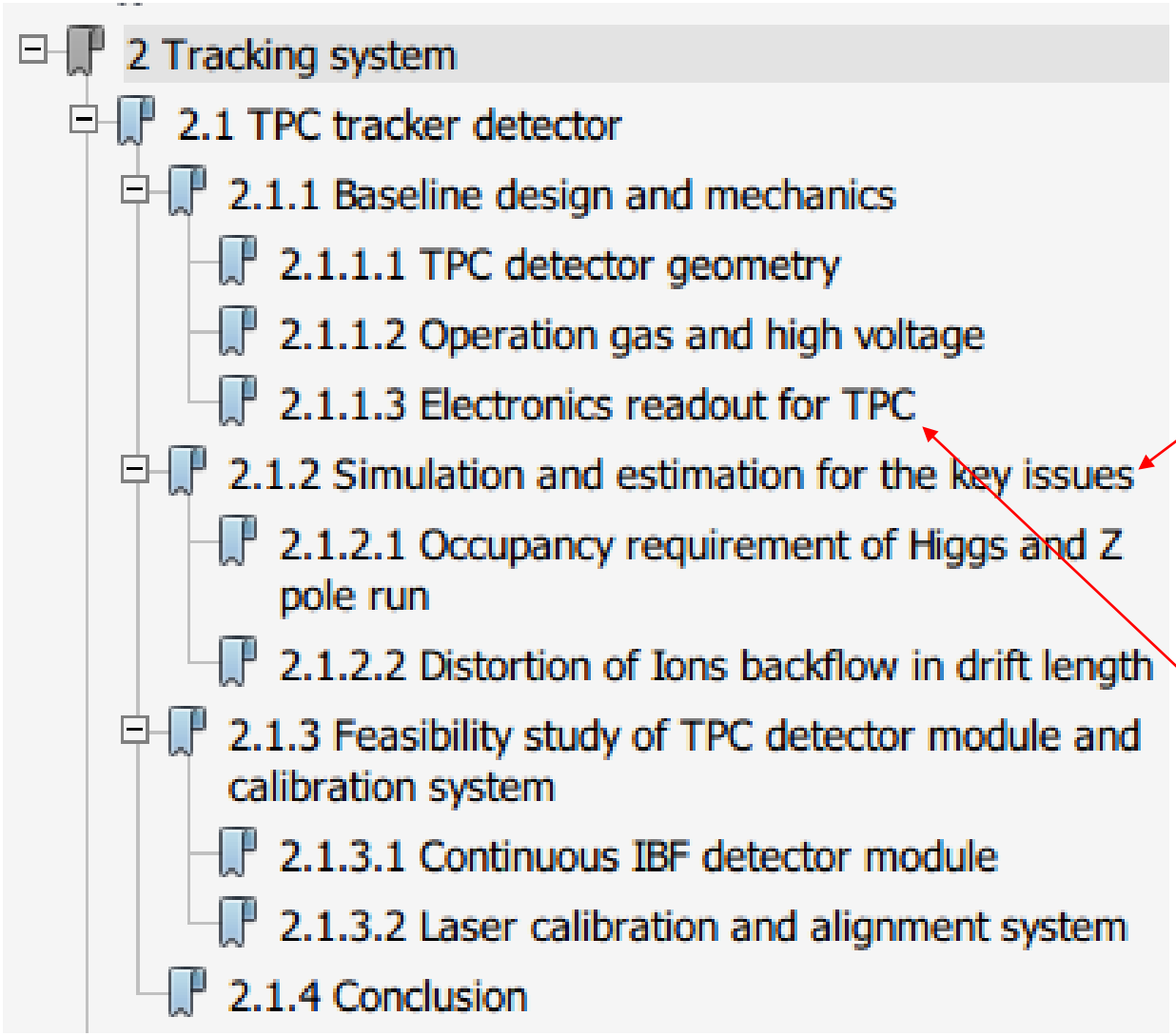
Laser calibration system:

- Laser calibration system for Z-pole run
- The ionization in the gas volume along the laser path occurs via two photon absorption by organic impurities
- Calibrated drift velocity, gain uniformity, ions back in chamber
- Calibration of the distortion
- Nd:YAG laser device@266nm



TPC prototype integrated with laser system

Outline of CEPC TPC track CDR



- 13 pages has been Uploaded
- 1st revision based on Prof. Tianchi's comments
- Electronic part has added from Deng Zhi

Posters for CEPC Workshop on Nov.6-8

- Progress on the continuous Ion Back Flow reduction TPC module (Zhang Yulian, IHEP) DONE
- Status and design the TPC prototype with the 266nm laser calibration system (Wang Haiyun, IHEP) DONE
- Design and progress on the low power consumption of ASIC chip with 65nm (Deng Zhi, Tsinghua) DONE
- Physics requirement and feasibility study of TPC track detector on CEPC (Qi Huirong, IHEP) DONE
- Printed on Saturday this week by Yulian

CDR mini-review on Nov. 10-11

- Speaker: Huirong (10-15mins)

- Discussion (50-60mins)
  - Gao Yuanning , Tsinghua , Physics
  - Zhao Tianchi, Physics and detector
  - Deng Zhi, Tsinghua, Electronics
  - Zhang Yulian, IHEP PhD, Detector