Progress of Pixelated readout TPC for CEPC TDR

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Weekly meeting of CEPC Track Group, June 18, 2024

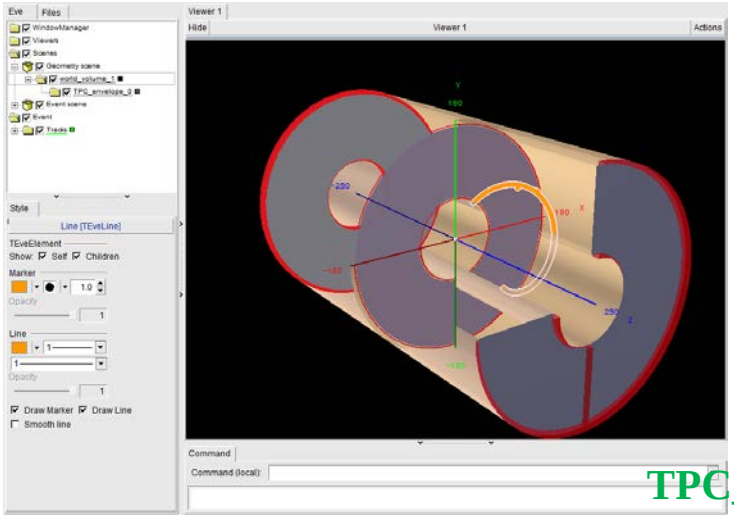
Content

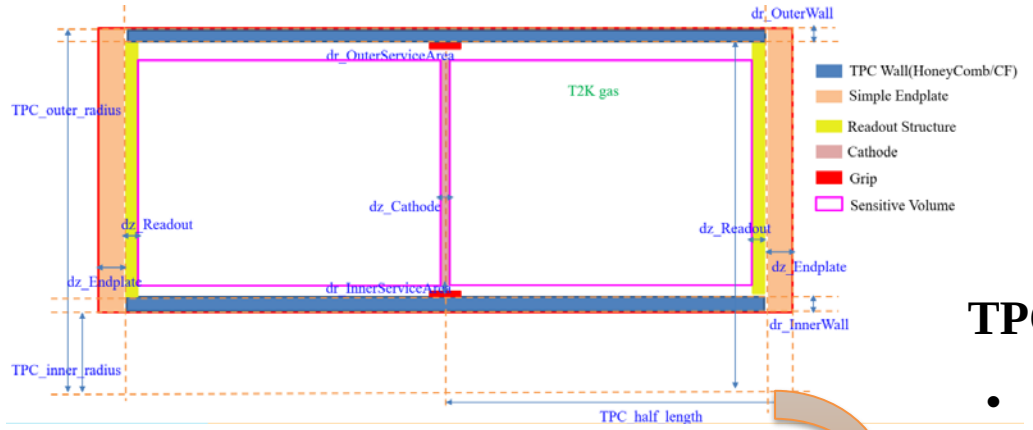
- **Update TPC parameters to CEPCSW**
- **Optimization of Endcap and barrel**

Update TPC parameters to CEPCSW software package

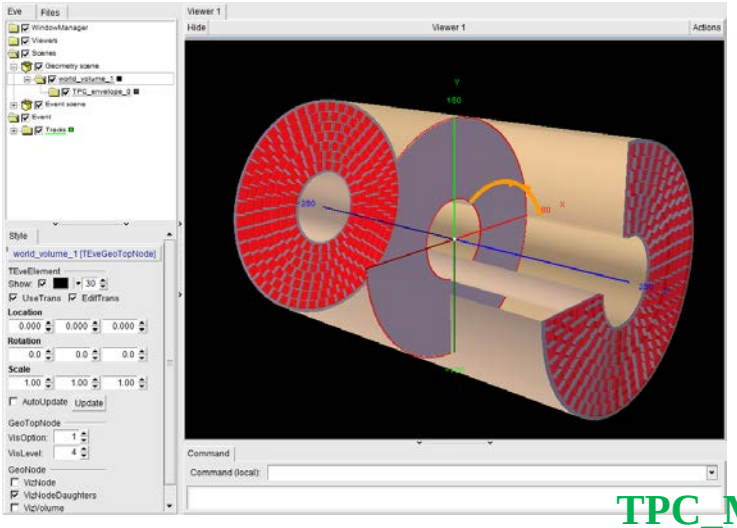
- All parameters of TPC detector **completed** to input CEPCSW software package.
  - Based on the update geometry of TPC as the track detector in CEPC TDR

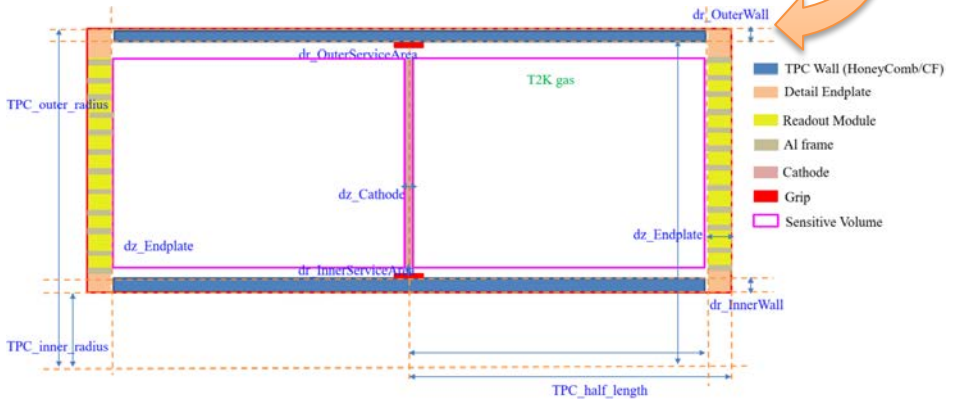
Xin She





TPC_Simple_TDR_o1-v01





TPC_ModularEndcap_TDR_o1-v01

TPC parameters updated to CEPCSW

- Gas Volume: T2K mixture gases
- MPGD Readout: Micromegas detector
- Barrel: Honey comb and CF options
- Endplate: optimization to the details design
- Mechanics: update geometry

Carbon Fiber barrel

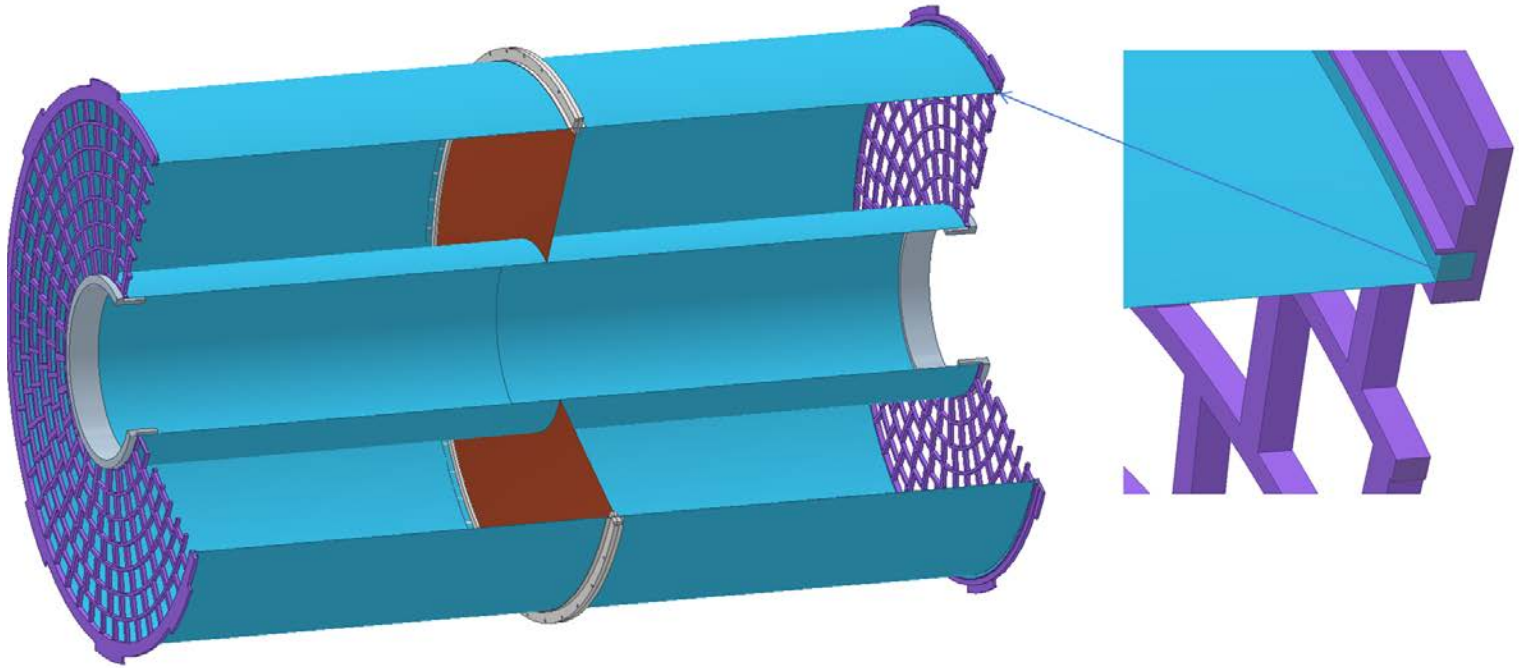
- Consideration of new Carbon Fiber barrel instead of the honeycomb barrel (LCTPC)
- Low material of the TPC barrel (**FEA calculation on going**)

Yue Chang

0.55% X_0 in total, including

Material budget of TPC barrel

Layer of the barrels	D[cm]	X_0[cm]	d/X_0[%]
Copper shielding	0.001	1.45	0.07
CF outer barrel	0.010	25.28	0.04
Mirror strips	0.003	1.35	0.19
Polyimide substrate	0.005	32.65	0.02
Field strips	0.003	1.35	0.19
CF inner barrel	0.010	25.28	0.04
Sum of the material budget			**0.55**



FEA calculation of the barrel

- Low material of the TPC barrel (**FEA calculation**)

Junsong Zhang

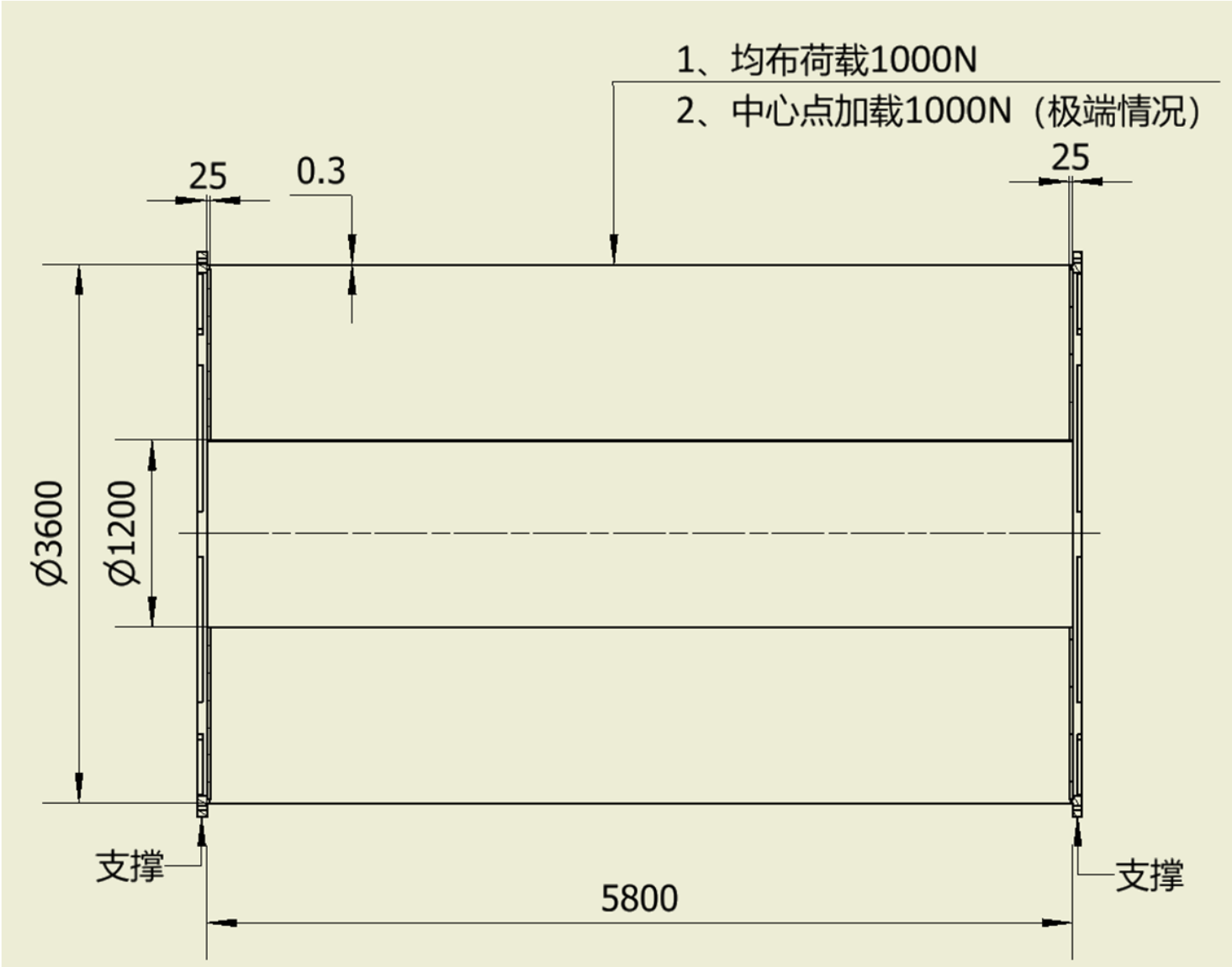
模型建立

加载重力场：

端部重量450Kg；

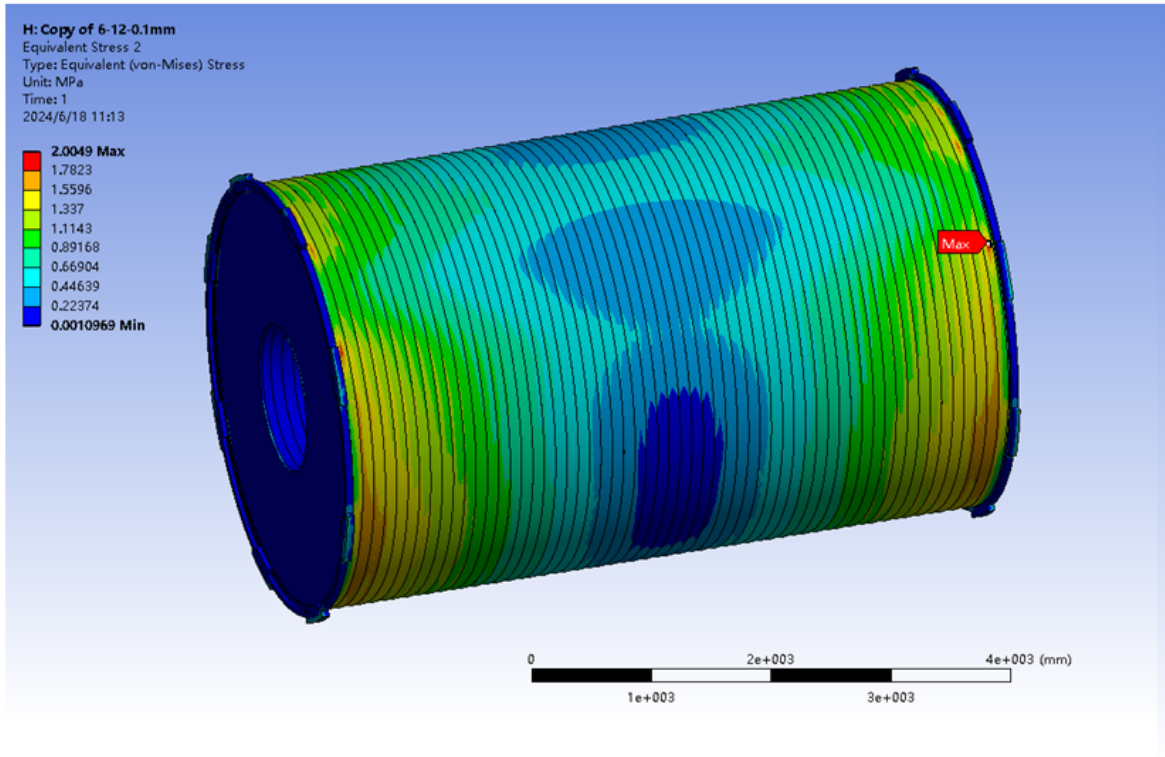
桶部加载重力100Kg；

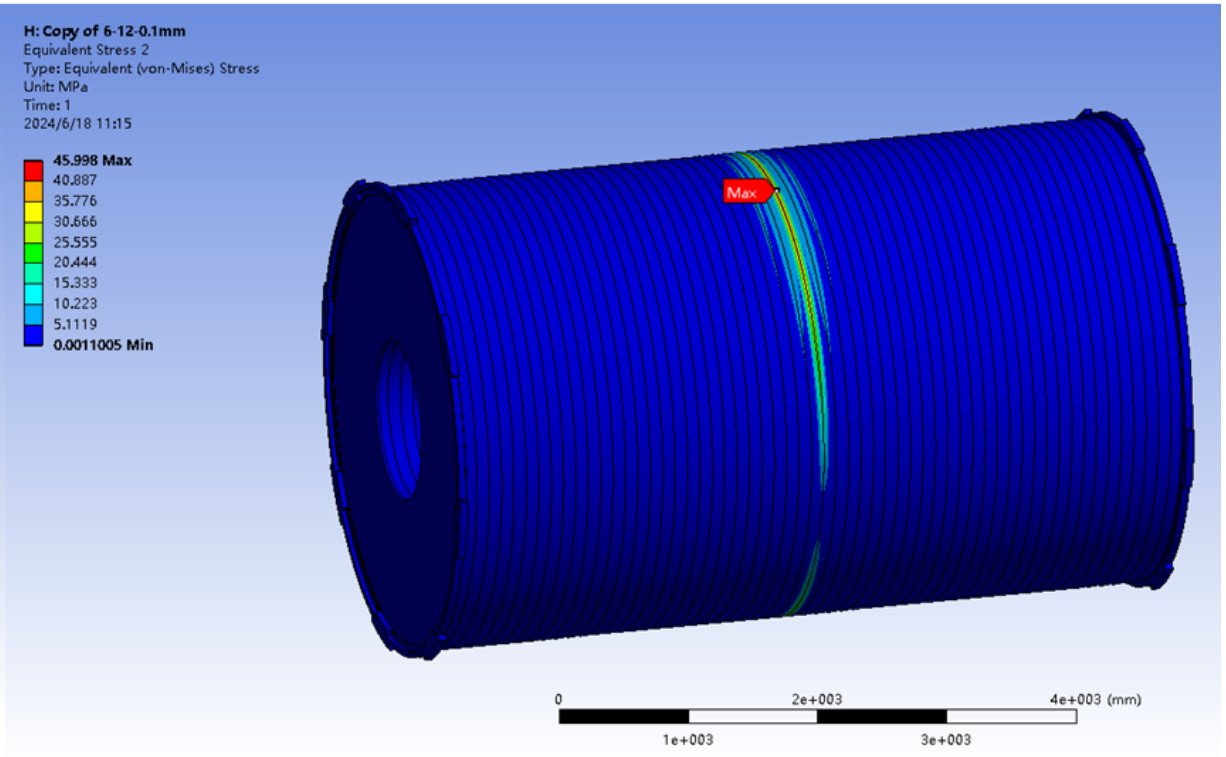
壁厚0.3mm, 0.1mm



Parameters of the barrel

- Low material of the TPC barrel (**FEA calculation on going**)
  - Integrated with the additional OTK, ITK…



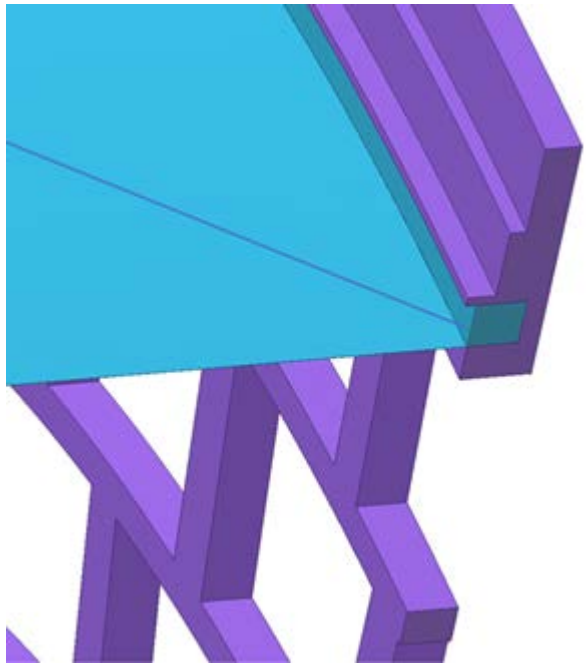


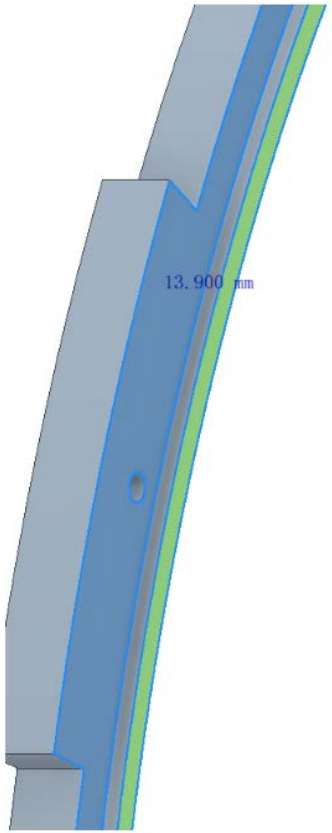
均布荷载时最大应力2Mpa，中心集中荷载最大应力46Mpa，超过许用剪应力。

因此当壁厚为0.1mm时，有可能会发生断裂。

Ongoing of FEA

- Low material of the TPC barrel (**FEA calculation contented using 0.3mm CF barrel**)
- Optimization of the connection backframe should be carefully considered.





Many thanks!