



The Progress of Super Tau Charm Facility in China

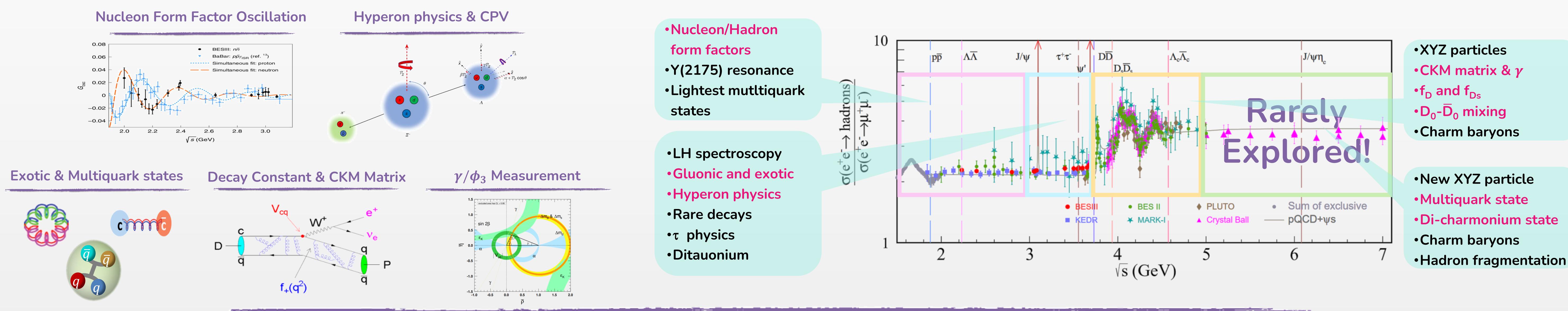
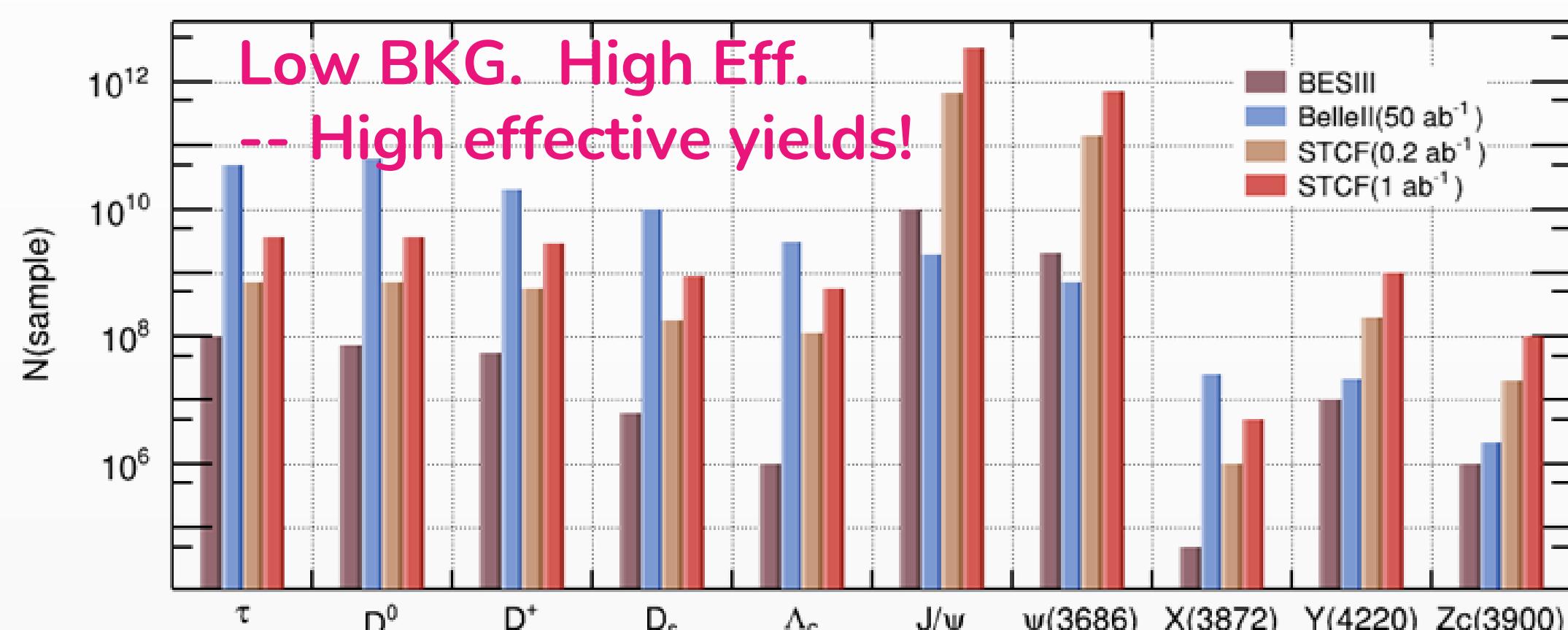
Zekun Jia (zkjia@mail.ustc.edu.cn)

State Key Laboratory of Particle Detection and Electronics, University of Science and Technology of China, Hefei 230026, China

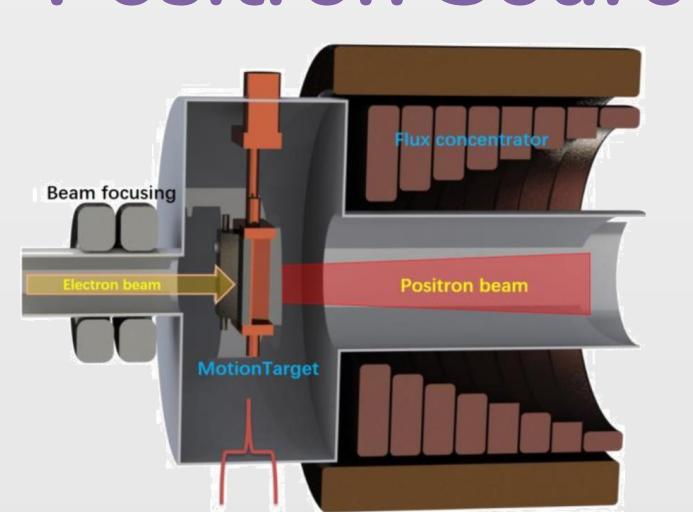
On behalf of the STCF working group

STCF: Introduction & Physics Opportunities

- Next generation **high luminosity e^+e^- collider experiment in China**
- $E_{cm} = 2\text{--}7 \text{ GeV}$, $\mathcal{L}_{peak} = 0.5 \times 10^{35} \text{ cm}^{-2}\text{s}^{-1}$
- Potential for \mathcal{L} improvement & beam polarization
- ~80 (>20 out of China) institutions, >400 interested members
- ~0.4 B CNY funding for TDR R&D; 4.1 B CNY for Construction
- Preliminary timeline: Construction: 2025-2031; Operation: 2032-?



Positron Source

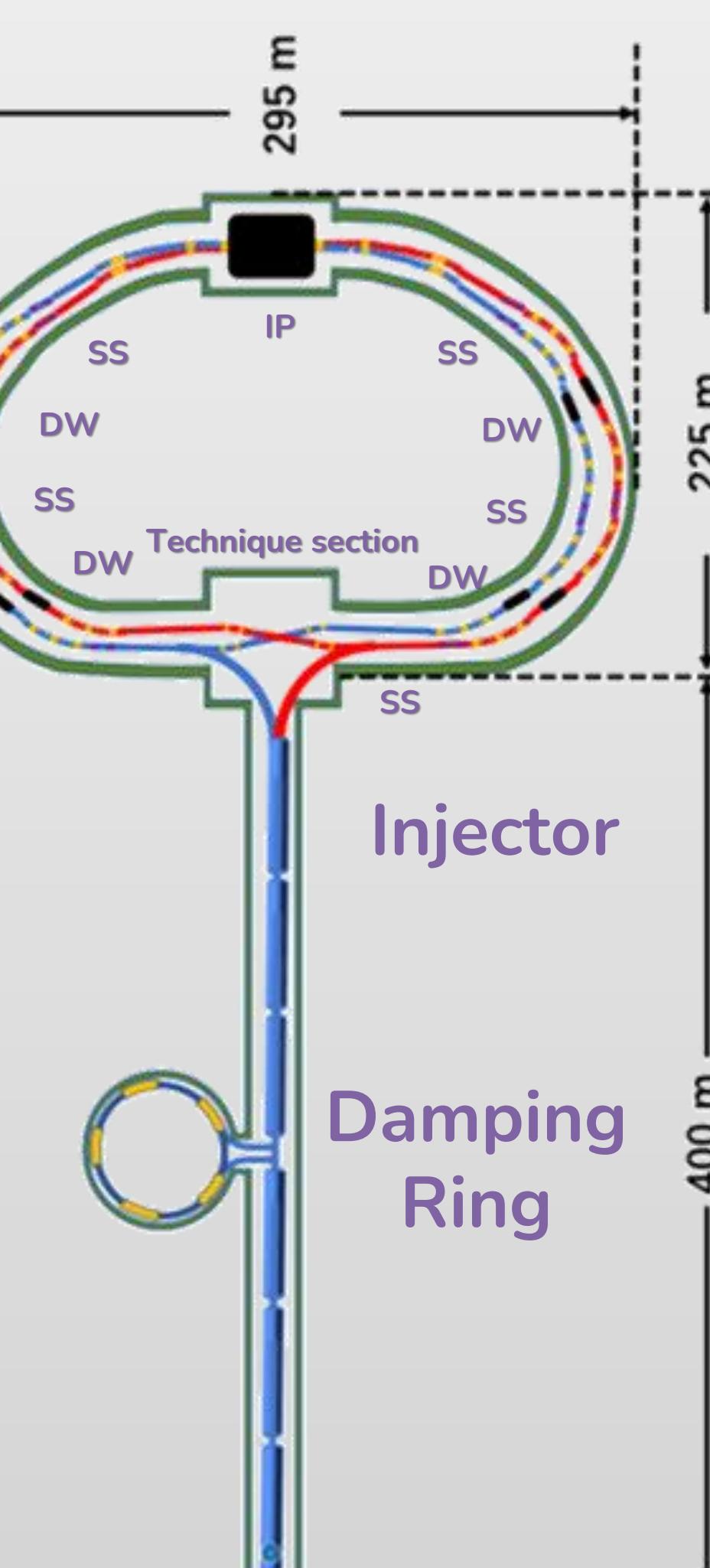


- Single crystal tungsten
- Motion target
- Positron yield: 0.3

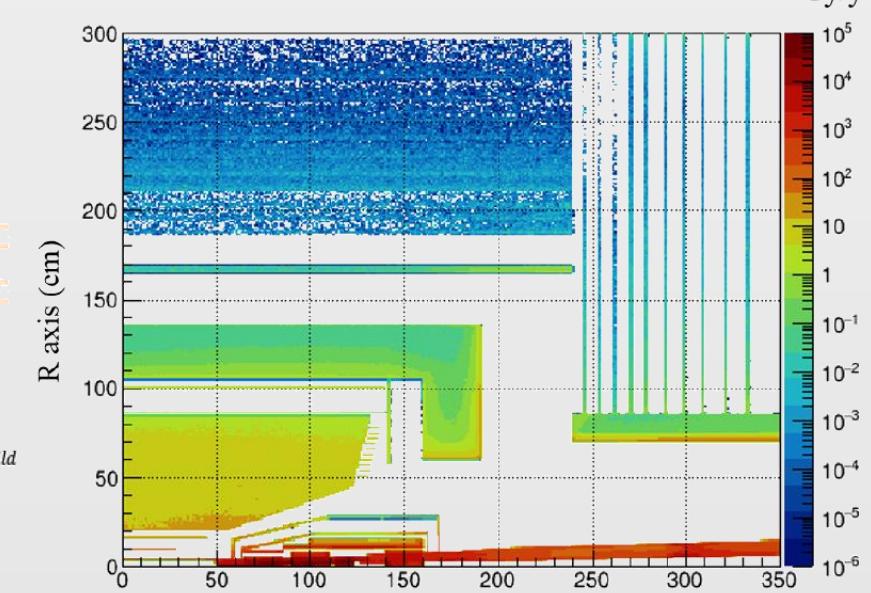
Accelerator R&D Highlights

Lattice Design

- Large Piwinski angle + Crab Waist
- Multi-Bend Achromat lattice
- Design $\mathcal{L} = 0.5 \times 10^{35} \text{ cm}^{-2}\text{s}^{-1}$
- $\tau_{touschek} > 100 \text{ s}$

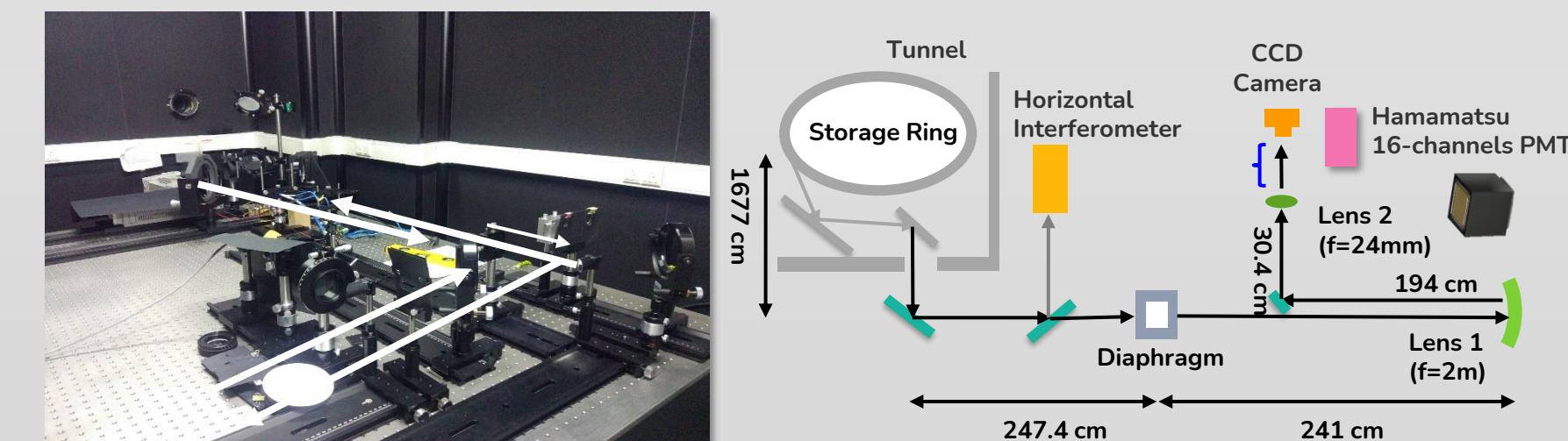


Machine Detector Interference



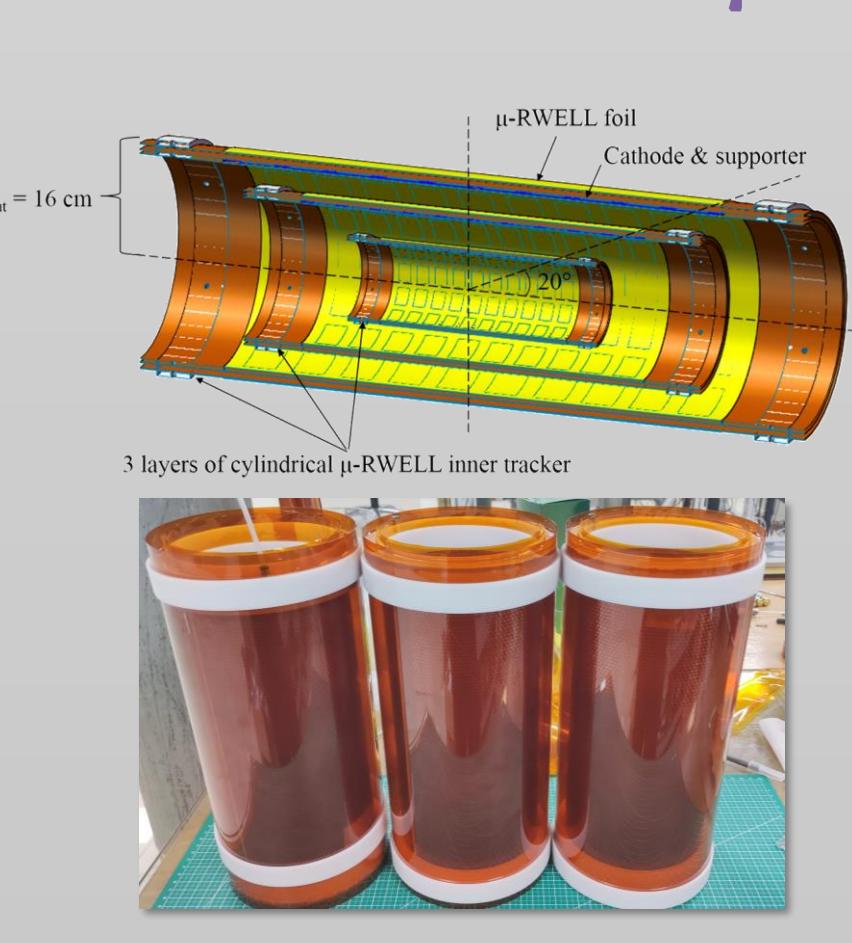
- SAD + GEANT4 tracking
- Dose & BKG rate input for detector
- Collimator optimization

Beam Monitor



- Synchrotron radiation imaging
- Bunch-by-bunch size measurement
- Pos. Res. < 10 μm

Inner Tracker – C-μR WELL

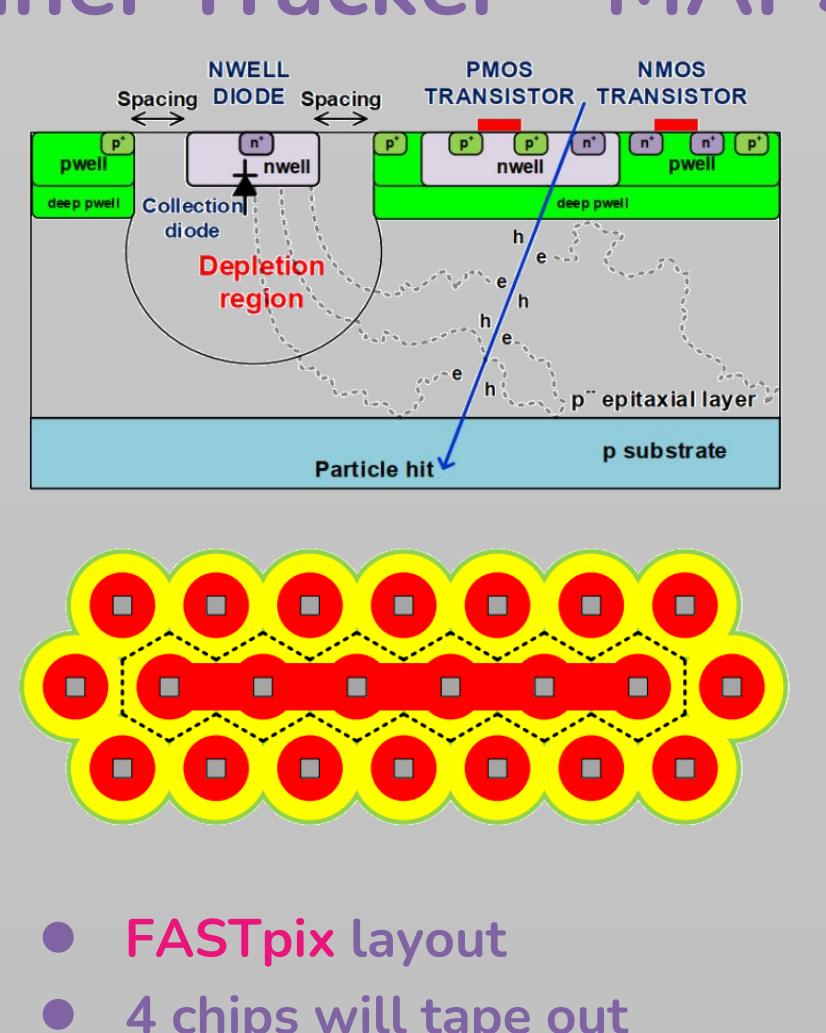


- DLC coated μR WELL
- μ-TPC mode

Detector R&D Highlights

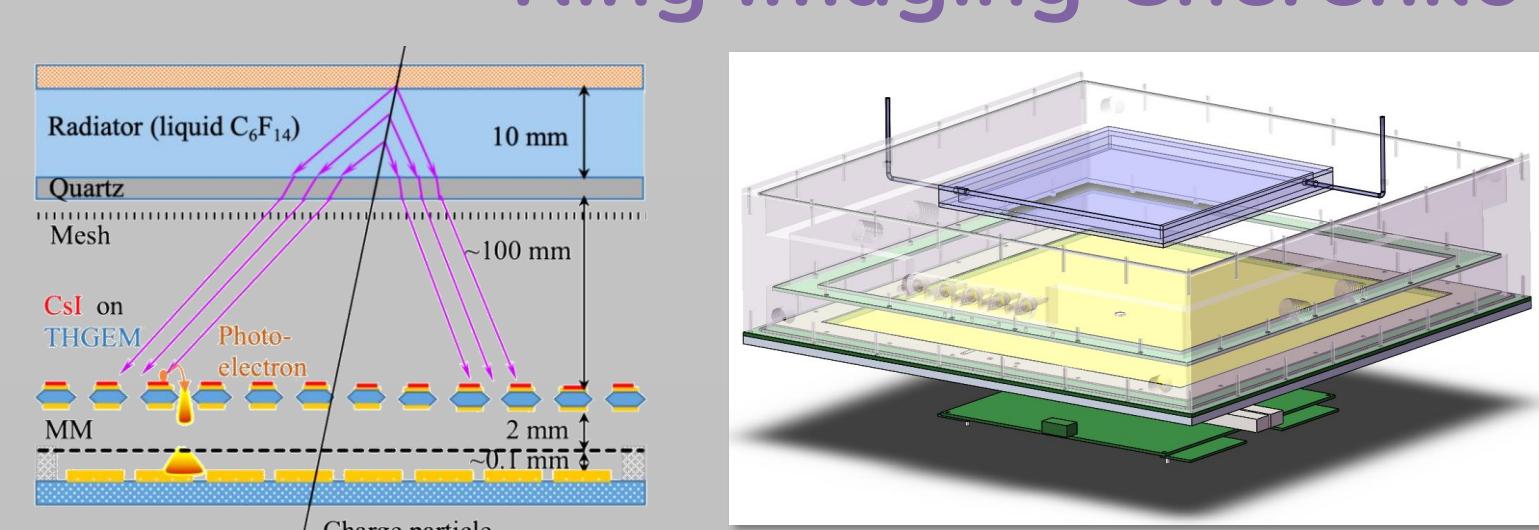
ITK	Cylindrical μR WELL CMOS MAPS
<ul style="list-style-type: none"> < 0.25% X_0 / layer $\sigma_{xy} < \sim 100 \mu\text{m}$ 	
MDC	Cylindrical Drift Chamber
<ul style="list-style-type: none"> $\sigma_{xy} < 130 \mu\text{m}$ $\sigma_p/p \sim 0.5\%$ @ 1 GeV/c $dE/dx \sim 6\%$ 	
PID	RICH with MPGD DIRC-like TOF
<ul style="list-style-type: none"> π/K (and K/p) 3-4 σ separation up to 2 GeV/c 	
EMC	Pure CsI + APD
<ul style="list-style-type: none"> E range: 0.025-3.5 GeV $\sigma_E (\%)$ @ 1 GeV Barrel: 2.5 Endcap: 4 Position Resolution: 5 mm 	
MUD	RPC + Scintillator
<ul style="list-style-type: none"> 0.4-2 GeV π suppression > 30 	

Inner Tracker – MAPS



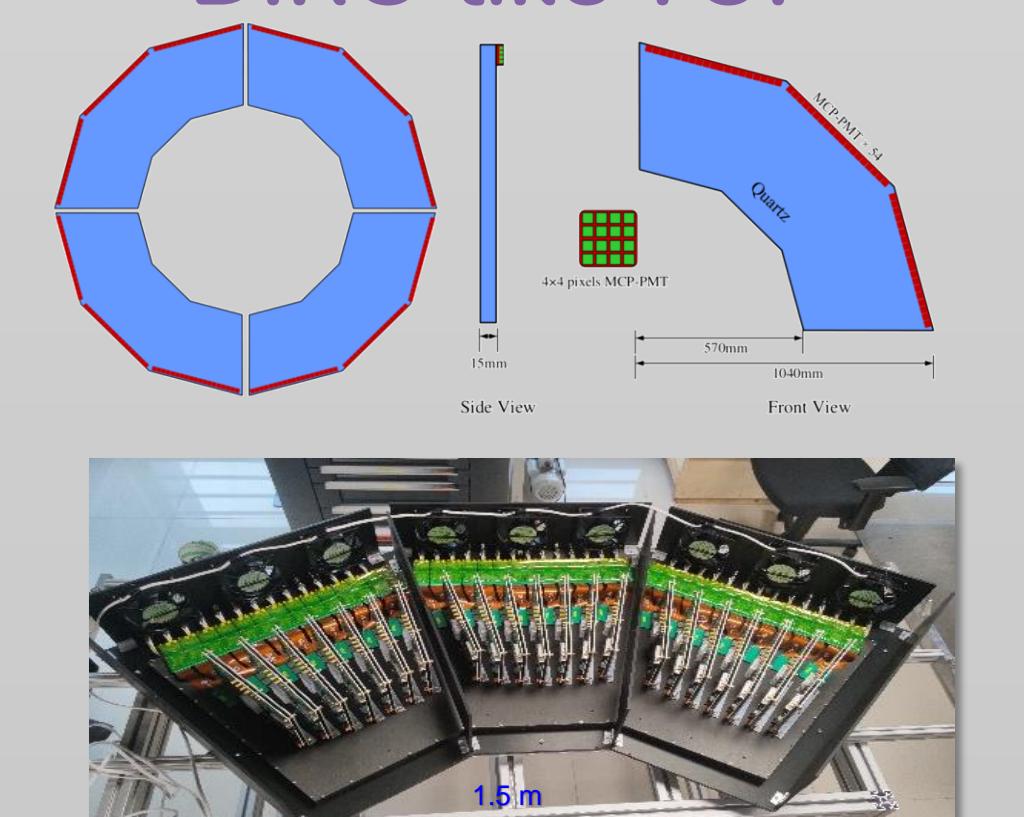
- FASTpix layout
- 4 chips will tape out

Ring Imaging Cherenkov Detector



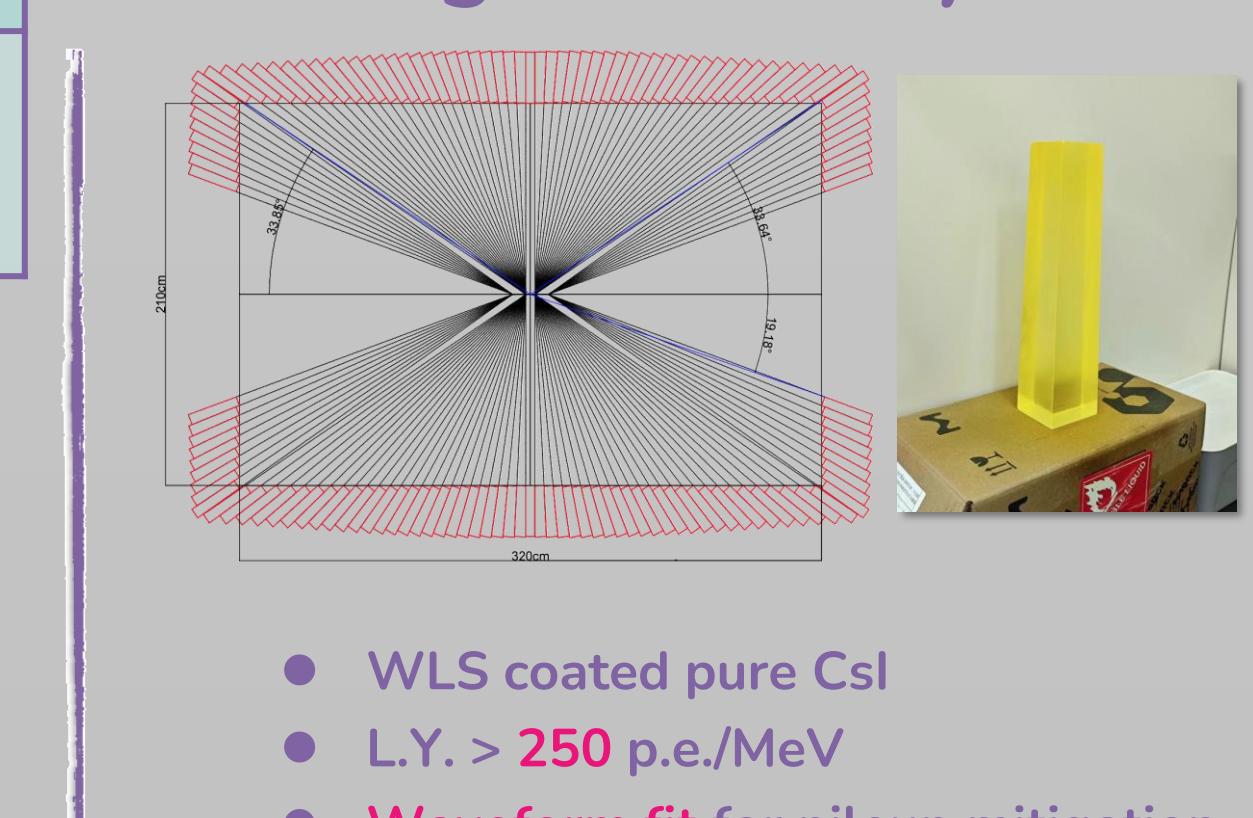
- CsI+THGEM+MMS photon counter
- liquid C6F14 radiator
- ASIC electronics
- Prototype beam test

DIRC-like TOF



- Large area, high purity quartz plate
- Time-Pos. 2D reconstruction
- Prototype C.R. test

Homogeneous Crystal EMC



- WLS coated pure CsI
- L.Y. > 250 p.e./MeV
- Waveform fit for pileup mitigation

