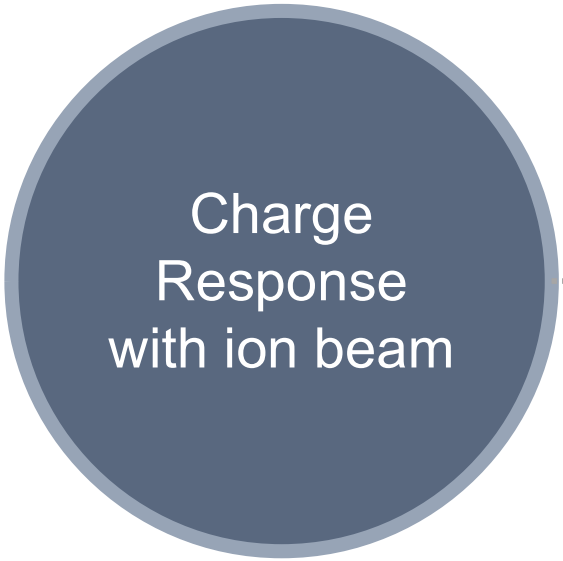
CN SCD TestBeam Proposal

Rui Qiao; Ke Gong; Wen-Xi Peng

Motivation of 2023 test beam



01

Re-confirm the best detector specification during bt2022 (80 um implant pitch, 25/60 um width, 20pF).

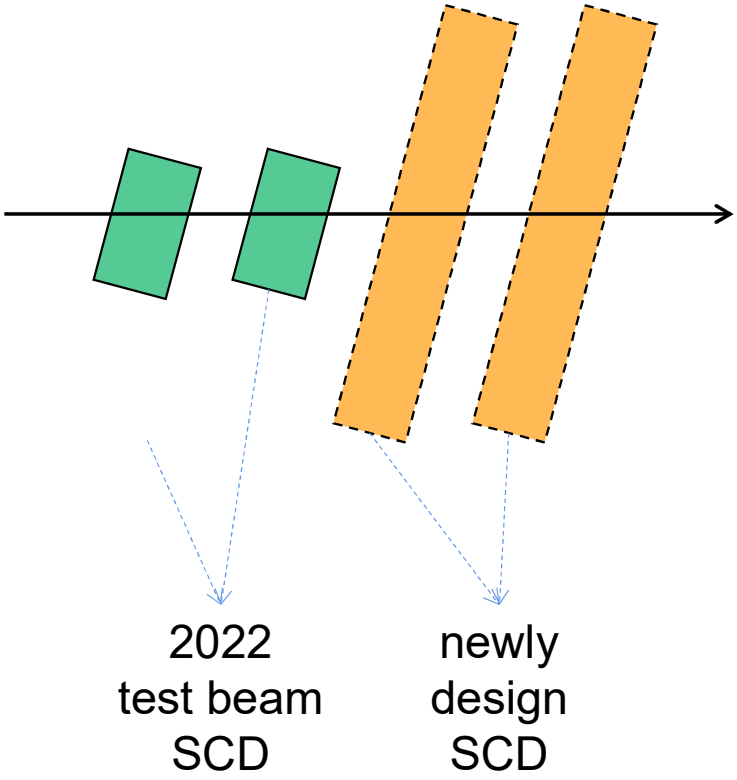
02

Angular repsonse study (0°, 15°, 30°, 45°)

03

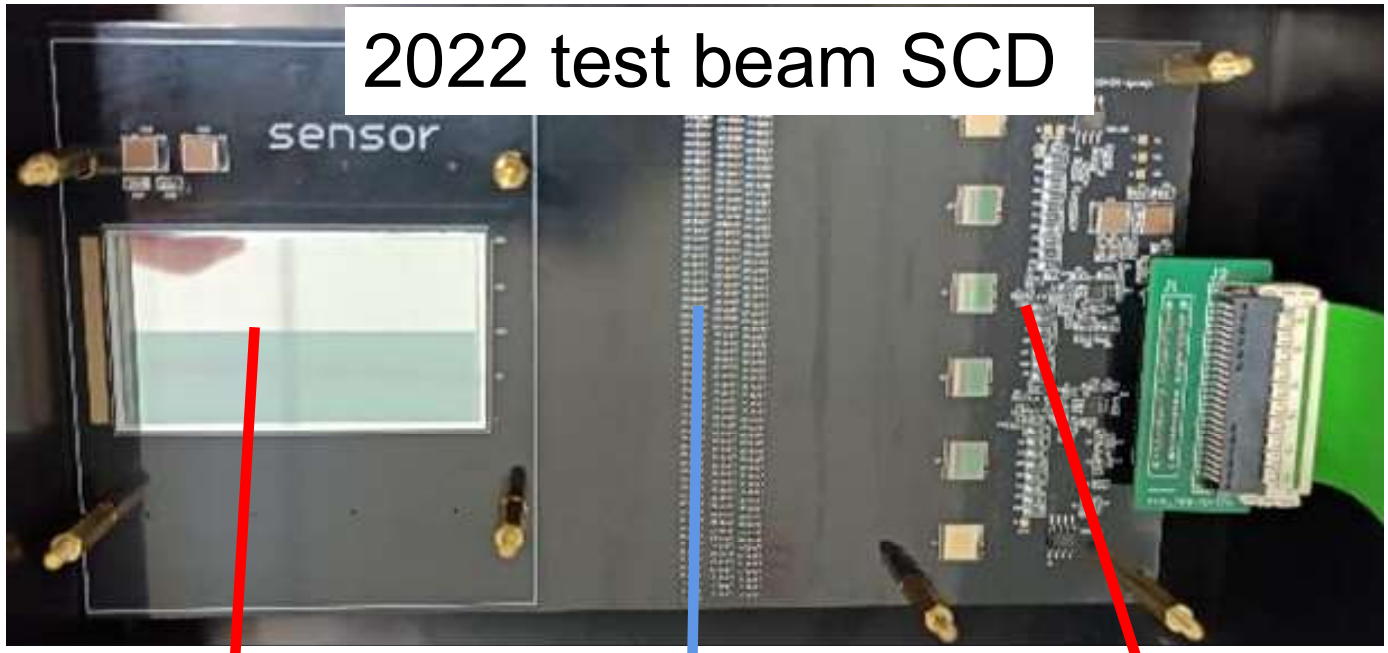
Test of CN-made SCD with 150 um readout pitch.

Detector setup for 2023 test beam



	Old SCD		New SCD	
	sect.1	sect.2	sect.1	sect.2
Thickness (um)	300		320	
Size (cm)	6*3.6		9.6*9.6	
ImpaInt Pitch (um)	80		75	150
Readout Pitch (um)	160		150	
Width (um)	60	25	55	90
Ext. Cap (pF)	20	20	TBD	

Plan for the new design detector

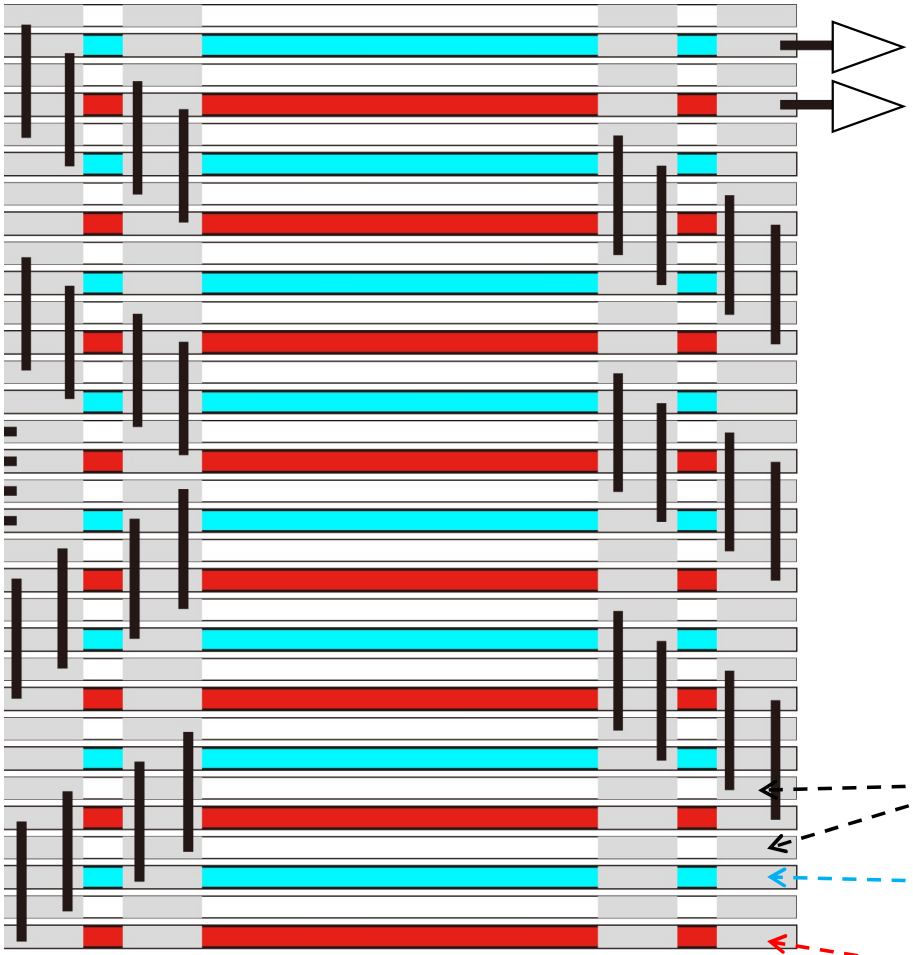


Replace by larger SCDs with new specifications.

Keep discrete capacitors.

Increase from 4 VAs into 6 VAs

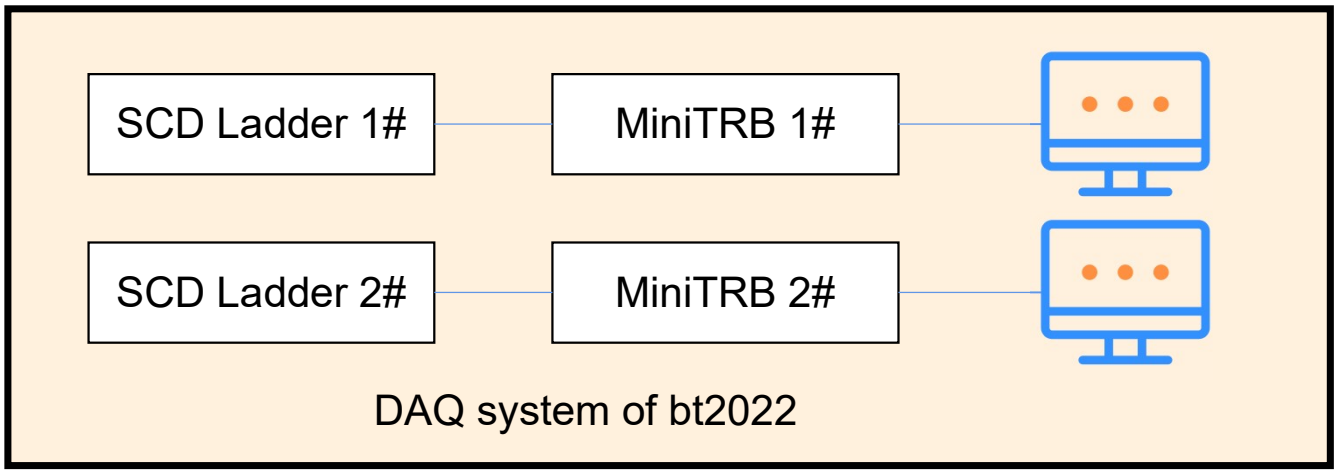
The daisy-chain detector readout



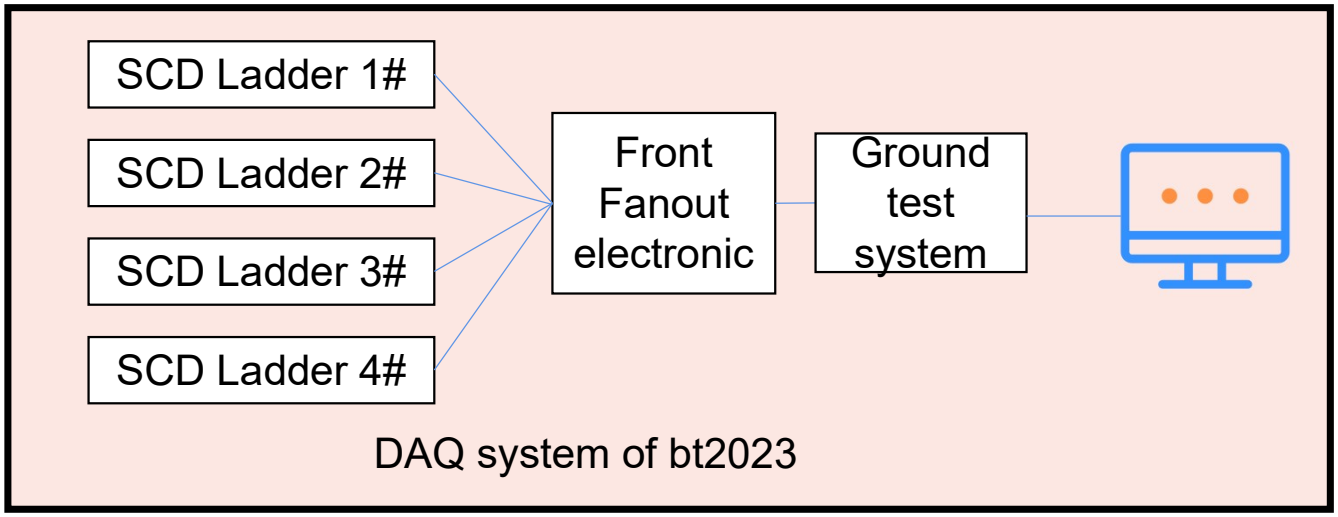
The daisy-chain pattern of a goup of 32 implant strips with 75 um implant pitch

- The bt2023 ladder has only **one** sensor, but SCD ladder should has **eight** sensors.
- To evaluate the charge resolution of long ladder, abouht **half** of the bt2023 sensor strips are daisy-chained. The length of the daisy-chained strips **is equivalent to eight** sensors.

DAQ system



- During bt2022, we use the DAMPE mini-TRB DAQ system. Two ladders need two DAQs.



- In bt2023, we will use the SCD DAQ system: all ladders connect to one fanout-board, which readout by one DAQ PC.

Conclusion

- CN-SCD will participate in the SPS ion beam.
- Two types of detectors: bt2022 SCDs by MICRON, and bt2023 SCDs by CN company.
- Try to use the new flight-model like SCD:
  - Detector has 150um readout pitch with size around 10cm*10cm.
  - half strips are daisy-chained to has length equvialent to eight sensors.
  - Use fanout-board for DAQ.
- The bt2022 SCDs are also used:
  - Limit the five types of capacitors into only one.
  - Compare the detector performance between MICRON & CN company