



pCT workshop,  
Bergen, Norway, March 7-8, 2018

1

# Activities of Kharkiv team for pCT/FoCal projects: current status

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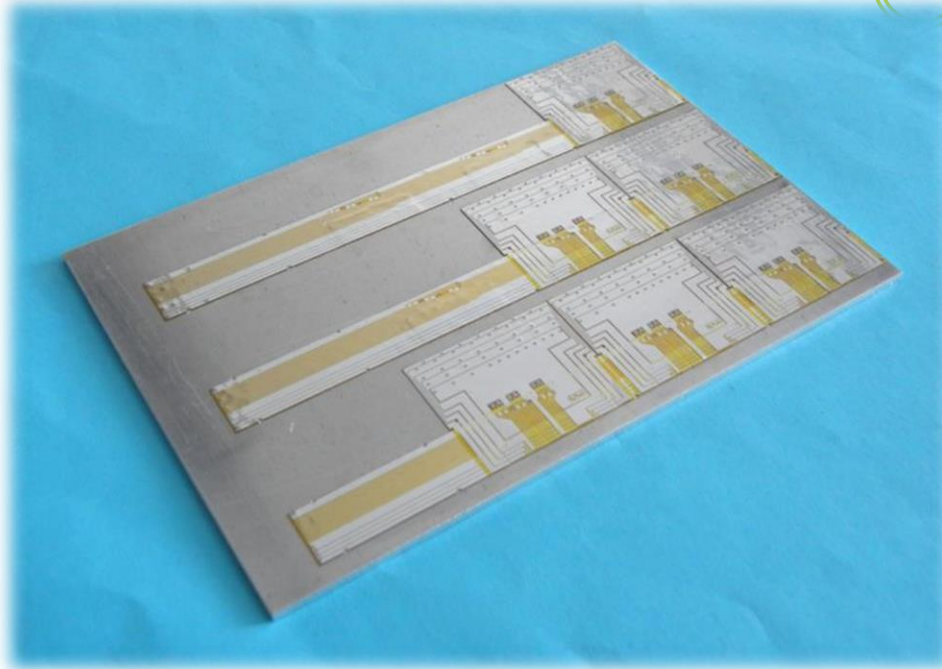
# Outline

2

- ❖ 2017-Performed works and obtained results
- ❖ 2018-Planned activities and current status:
  - mTower detector layer prototype
  - 9-chip string full-scale mock-up
- ❖ Conclusion

# 2017-Performed works and obtained results: pCT/FoCal slab mock-up (3-chip part of slab)

3



## **Performed works:**

- ✓ *approach is developed*
- ✓ *assembly procedure is developed*
- ✓ *mock-up and its components are designed*
- ✓ *photomasks are developed*
- ✓ *components are manufactured*
- ✓ *mock-up is assembled (delivered to NIKHEF)*

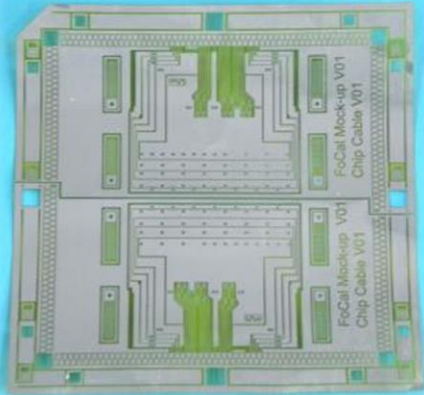
## **Obtained results:**

- *At components manufacture and assembly of mock-up any issues were not observed*
- *Developed approach for possible realization of pCT/FoCal slab is verified*
- *Proposed approach might be considered as a base line for slab development based on MAPS*
- *Approach need to be tested on prototypes (next step) with real ALPIDEs*

# Developed and fabricated components for slab mock-up

4

## Chipcable



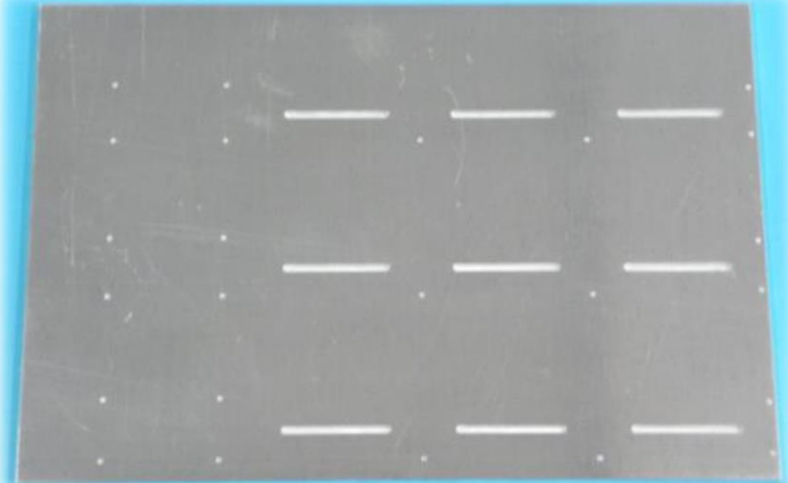
## Flex top layer



## Flex bottom layer



## Carrier



## Cover layer (insulator)

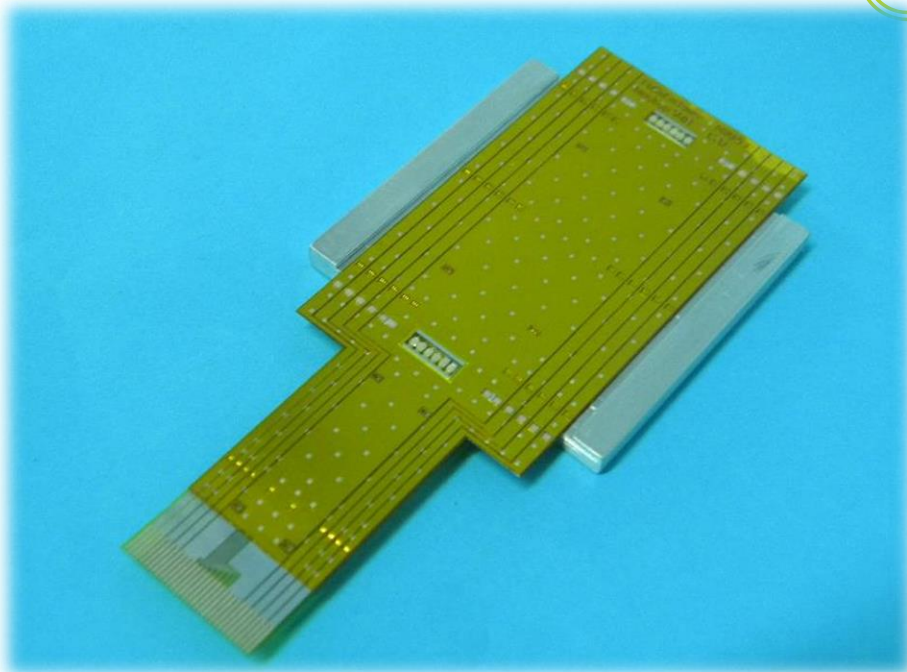


## SMD Flex mount



# 2017-Performed works and obtained results: pCT/FoCal mTower detector layer mock-up

5



## **Performed works:**

- ✓ *approach is developed*
- ✓ *assembly procedure is developed*
- ✓ *mock-up and its components are designed*
- ✓ *photomasks are developed*
- ✓ *components are manufactured*
- ✓ *mock-ups are assembled (delivered to NIKHEF and UiB)*

## **Obtained results:**

- *At components manufacture and assembly of mock-up any issues were not observed*
- *Developed approach for possible realization of pCT/FoCal mTower detector layer is verified, however, some minor modifications in design need to be applied*
- *Proposed approach might be considered as a base line for pCT/FoCal mTower development based on MAPS*
- *Approach need to be tested on prototypes with real ALPIDEs*

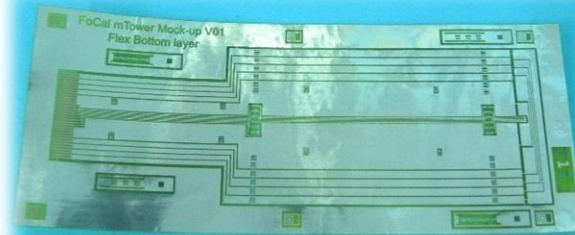
# Developed and fabricated components for detector layer mock-up

6

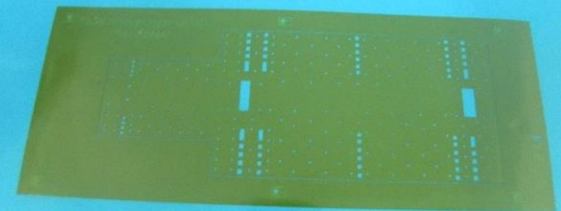
**Absorber**



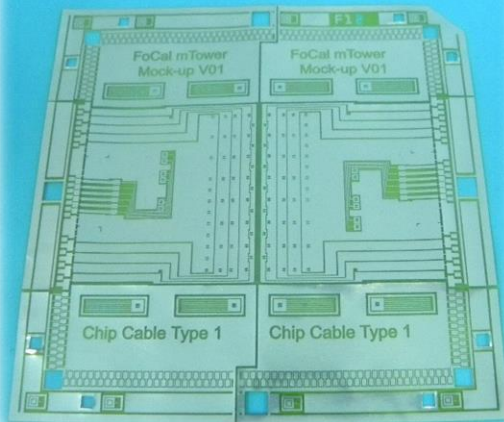
**Flex bottom layer**



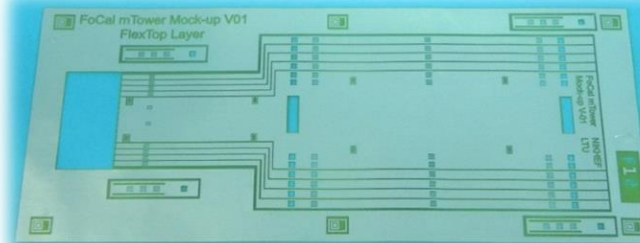
**Flex spacer layer**



**Chipcable**



**Flex top layer**



**Flex cover layer**



**SMD Flex mount**



# Key features of the approaches

7

- before mounting Alpides on carrier/absorber full functional test might be performed (special chipcables are using). Such approach allows to exclude mounting defective MAPSs
- flexible layers are made of aluminium-polyimide adhesiveless foiled dielectric (Al-30um, Pi -20um )
- connecting method for chip-to-flex connection is direct ultrasonic welding (Single-point TAB) traces of flex to the chip (wires are not needed)

# 2018-Planned activities and current status

8

Activity		Planned term	Current status
1	Prototype of detector layer (2 chips) for pCT/FoCal mTower	<i>March 2018</i>	ONGOING
2	Mock-up of sensor layer/string (9 chips) for pCT/FoCal slab	<i>March 2018</i>	ONGOING
3	Prototype of sensor layer/string (9 chips) for pCT/FoCal slab	<i>May 2018</i>	
4	Mock-up of sensor layer of pCT/FoCal slab (27 or 54 ALPIDEs, tbd)	<i>May 2018</i>	
5	Prototype of sensor layer of FoCal slab (27 or 54 ALPIDEs, tbd)	<i>July 2018</i>	
6	Production of ~30 detector layers for pCT/FoCal mTower	<i>tbd</i>	



# mTower detector layer prototype: current status

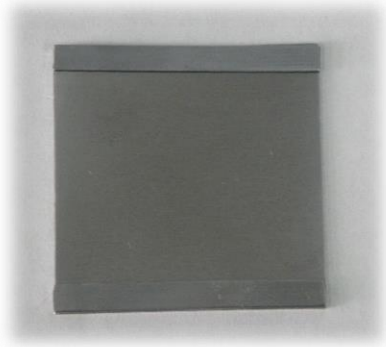
Activity		Status, plan
1	Discuss of design features with NIKHEF and UiB teams	<b>DONE</b> (week 3-5)
2	Design modification (prototype and components)	<b>DONE</b> (week 6)
3	Final agree design with NIKHEF and UiB teams	<b>DONE</b> (week 7)
4	Photomasks development	<b>DONE</b> (week 8)
5	Components fabrication	<b>DONE</b> (week 9-10)
6	Prototype assembly	<b>ONGOING</b> (week 10-11)
7	Delivery at CERN	<b>Week 12</b>

**Note: 1-2 test flexes for impedance measurements will be delivered with the prototype**

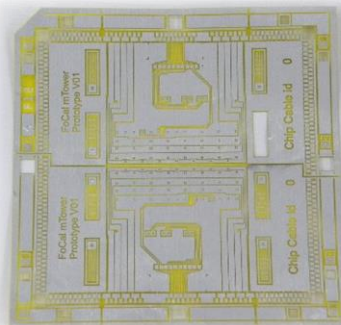
# Developed and fabricated components for detector layer prototype

10

**Absorber**

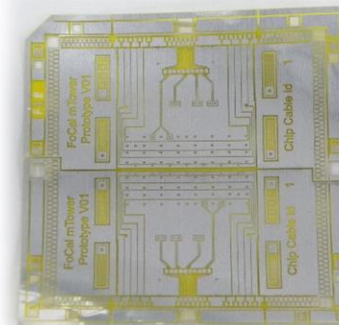


**ID 0**



**Chipcables**

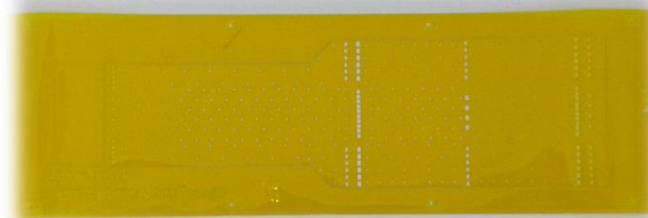
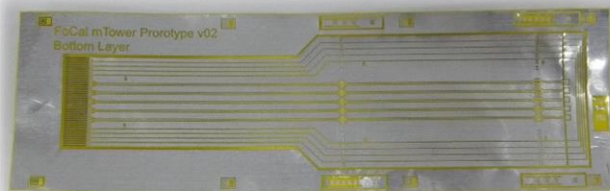
**ID 1**



**Flex bottom layer**

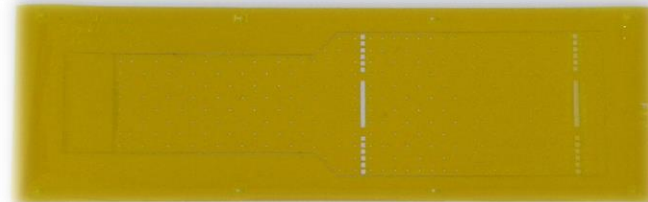
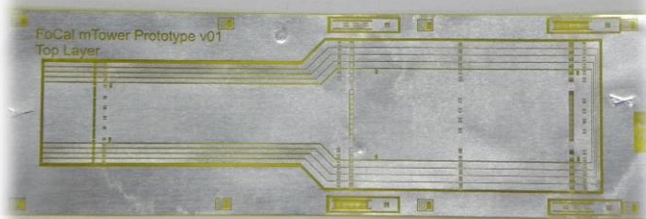
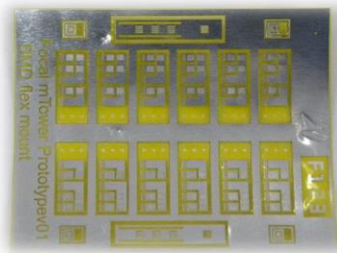
**Flex spacer layer**

**SMD Flex mounts**



**Flex top layer**

**Flex cover layer**



# 9-chip string full-scale mock-up: current status

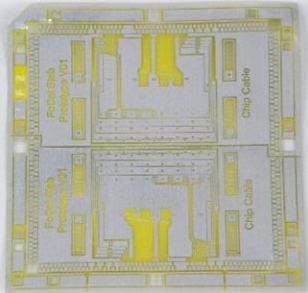
	Activity	Status, plan
1	Discuss of design features with NIKHEF and UiB teams	<b>DONE</b> (week 3-6)
2	Design modification (prototype and components)	<b>DONE</b> (week 7)
3	Final agree design with NIKHEF and UiB teams	<b>DONE</b> (week 8)
4	Photomasks development	<b>DONE</b> (week 9)
5	Components fabrication	<b>DONE</b> (week 10)
6	Mock-up assembly	<b>ONGOING</b> (week 10-11)
7	Delivery at CERN	<b>Week 12</b>

**Note: 1-2 test flexes for impedance measurements will be delivered with the mock-up**

# Developed and fabricated components for 9-chip full-scale string mock-up

12

**Chipcable**



**Carrier**



**Flex top layer**



**Flex bottom layer**



**SMD Flex mount**



**Cover layer (insulator)**



# Important note: test set-up

13

- ❖ For further steps (at least before mTower detector layers production) test set-up for functional testing need to be available at our lab (for testing ALPIDEs, detector layers, 9-chip strings)
- ❖ Preliminary works are done with NIKHEF team
- ❖ Further steps on creation of test set-up at our lab will be discussed in March-April

# Conclusions

14

- ❖ Initial data and features for designing mTower detector layer prototype and full-scale 9-chip string for pCT/FoCal slab are discussed and agreed with NIKHEF and UiB teams
- ❖ Works on creation of the detector layer prototype and 9-chip string are ongoing
- ❖ mTower detector layer prototype and 9-chip string for slab will be delivered at CERN on week 12
- ❖ Next steps will be clarified (if necessary) and agreed in March-April

# FoCal beam test schedule 2018

15

- At the PS-T9: July 18- 25
- At the SPS: August 1 -15
- In the ALICE mini frame: September  
*(during the technical stop in September till the end of the Pb run)*

**Note: The beam time is mainly for testing the mFoCal-Japan and if possible with the MAPS planes and/or mTower modules**

**Thanks  
a lot  
for your  
attention!**