

Status of the Backward EMC

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PANDA Meeting 20/1 – EMC Session

Mainz, 11.03.2020

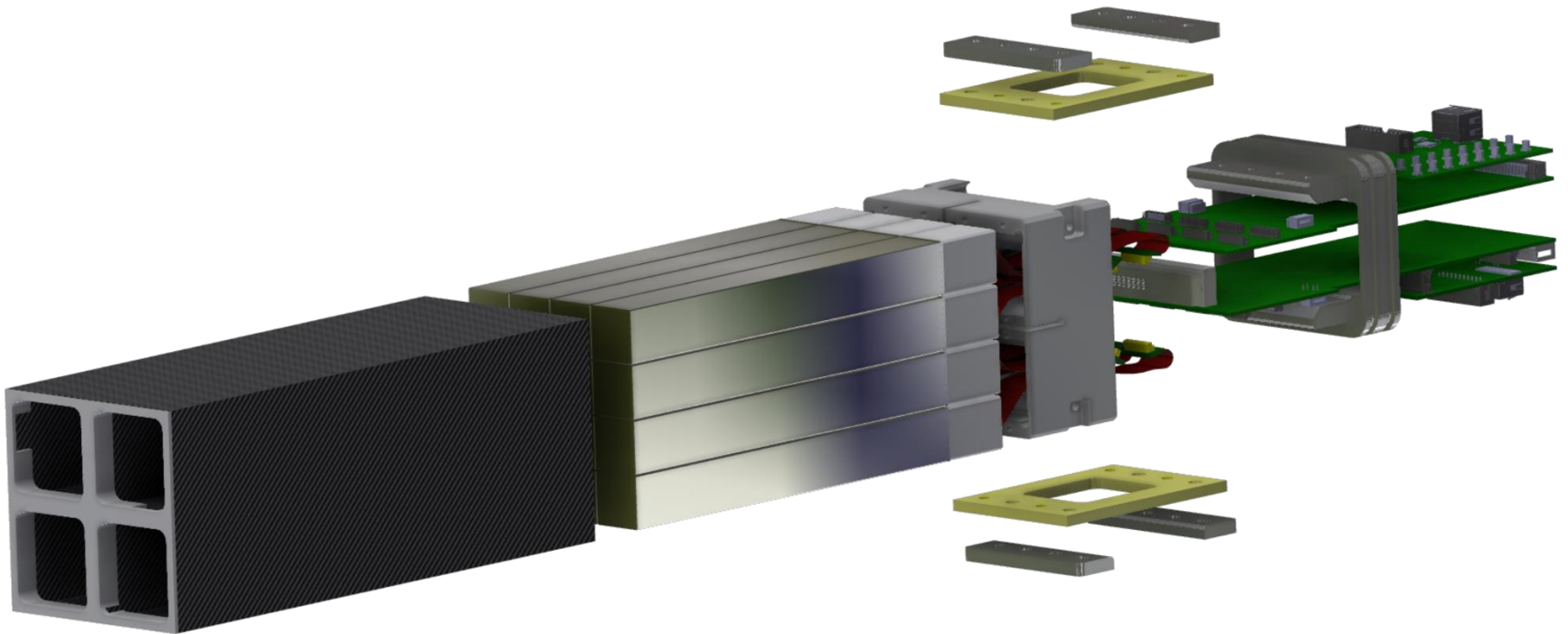
Outline

1. Submodule Components

2. Ongoing Manufacturing

3. Current Status

1. Submodule Components



APFEL Case – Parts

- APFEL ASIC
- Thermal pad
- Heat sink
- Alu capsule
- APD capsule

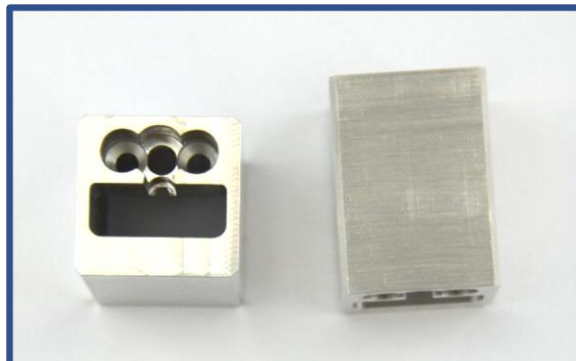
APFEL ASIC



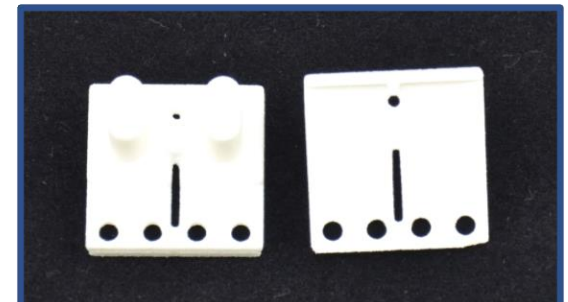
Thermal pad



Heat sink

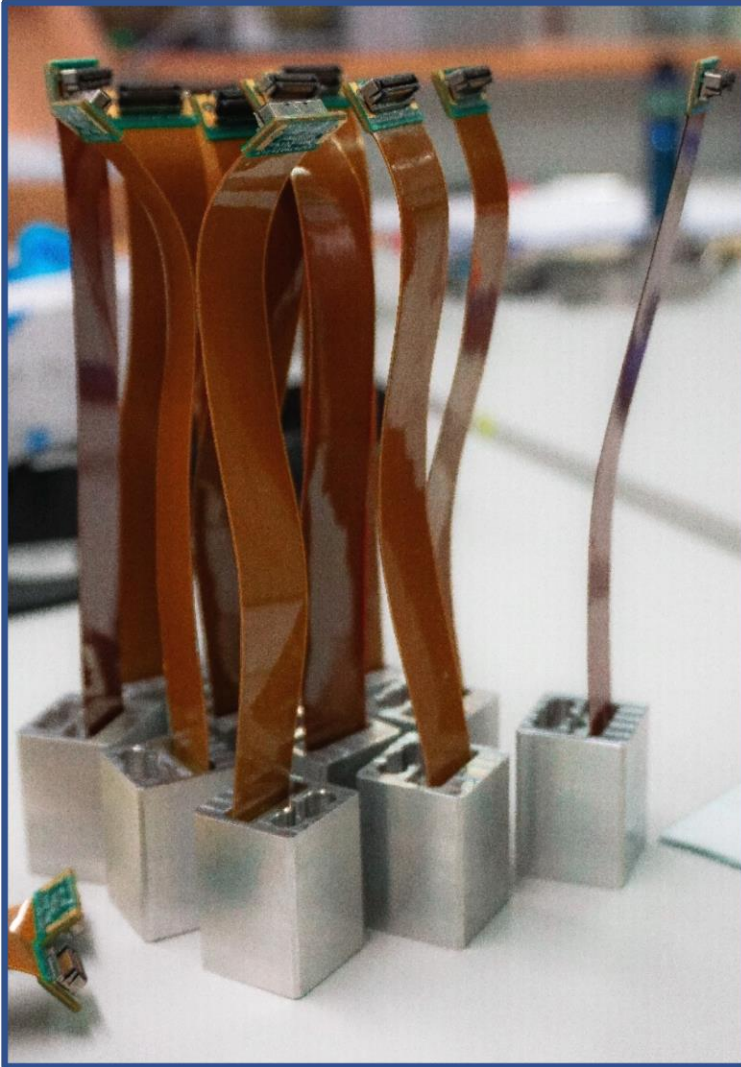


Alu capsule

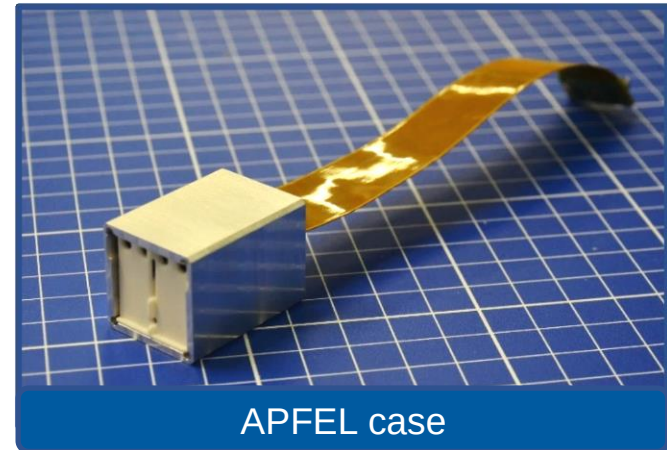


APD capsule

Assembly of an APFEL Case



- Can be done before submodule assembling
- Working time: 5 min
- Production time for 16 APFEL Cases: 1h 20min



APFEL case

Crystal Unit – Parts

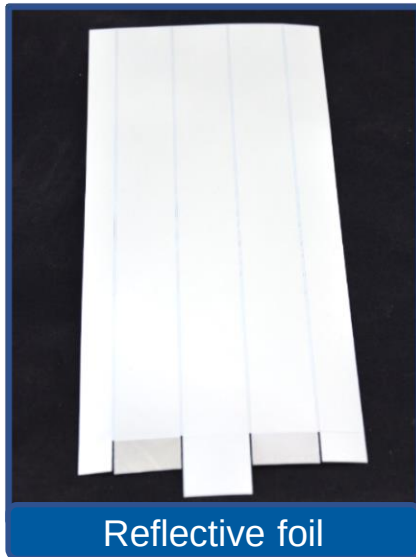
- Crystal
- 2 APDs
- APFEL case
- Reflective foil
- Optical cookie



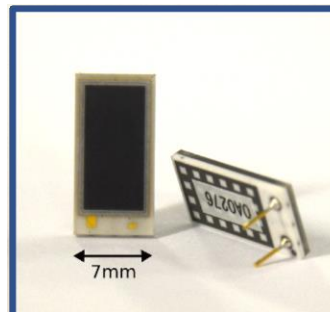
Crystal



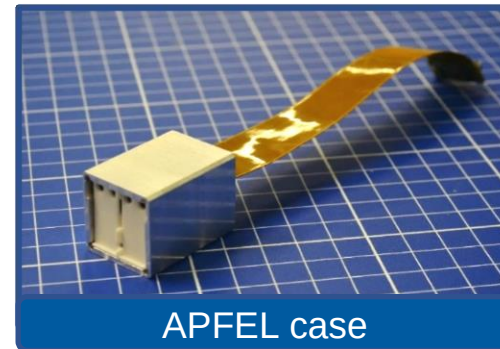
Optical
cookie



Reflective foil



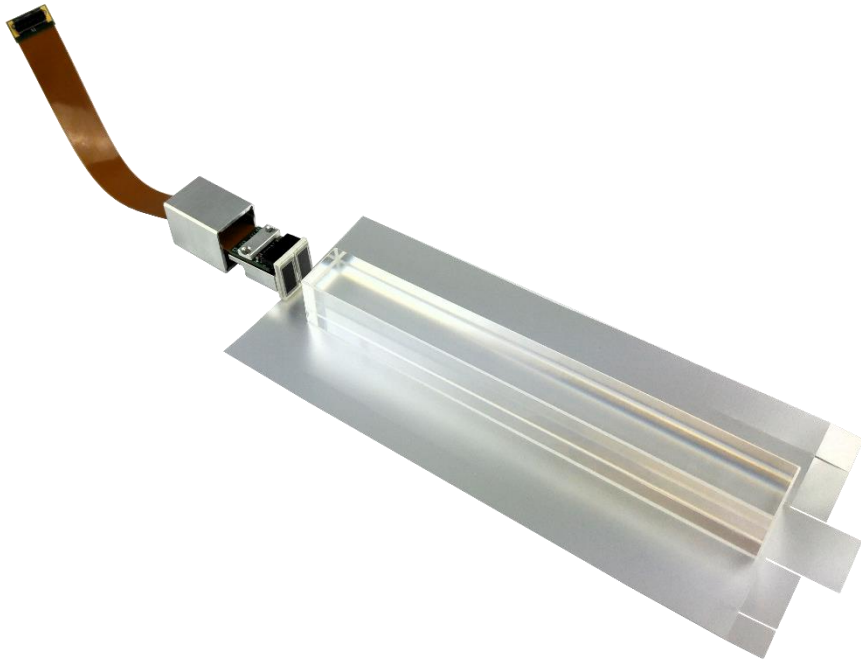
APDs



APFEL case

Assembly of a Crystal Unit

- Production time for one crystal unit:
10 min with two people
- Production time for 16 crystal units:
2h 40min



Submodule - Parts

- 16 Crystal units
- 2 Front-End boards
- 2 Service boards



Crystal unit



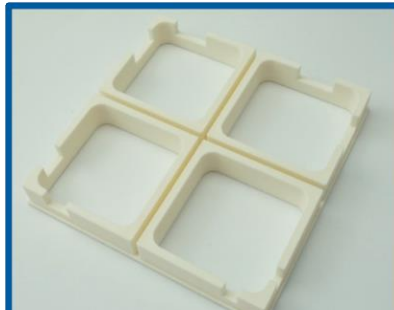
Service board



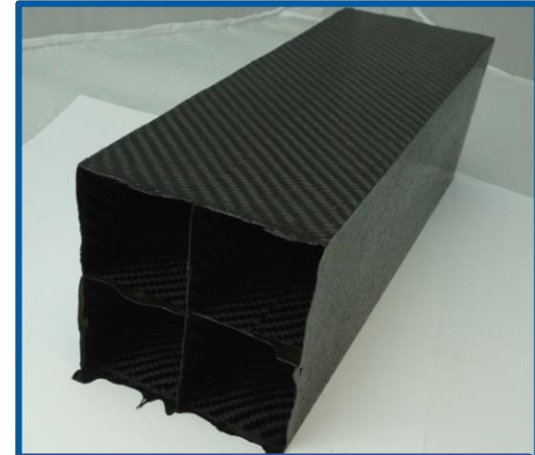
Front-End boards

Submodule - Parts

- 16 Crystal units
- 2 Front-End boards
- 2 Service boards
- Alveolus
- Stopper
- Alu insert



Stopper



Alveolus



Alu insert

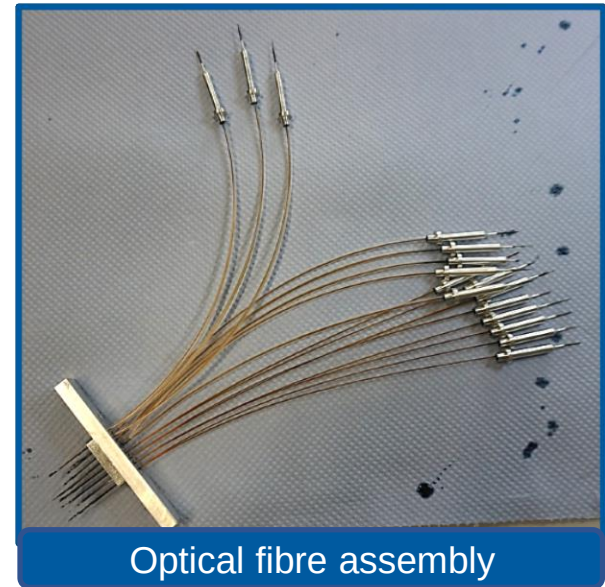
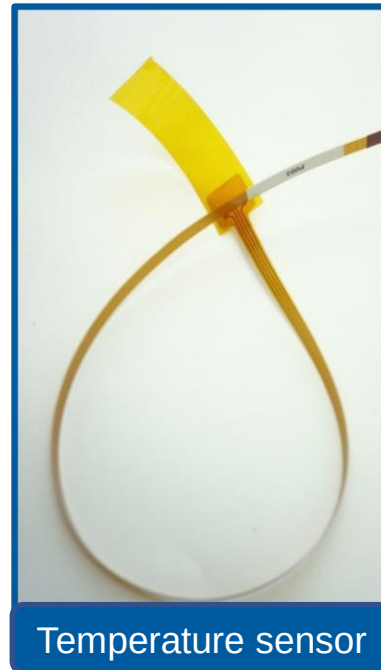
Submodule - Parts

- 16 Crystal units
- 2 Front-End boards
- 2 Service boards
- Alveolus
- Stopper
- Alu insert
- Holding parts



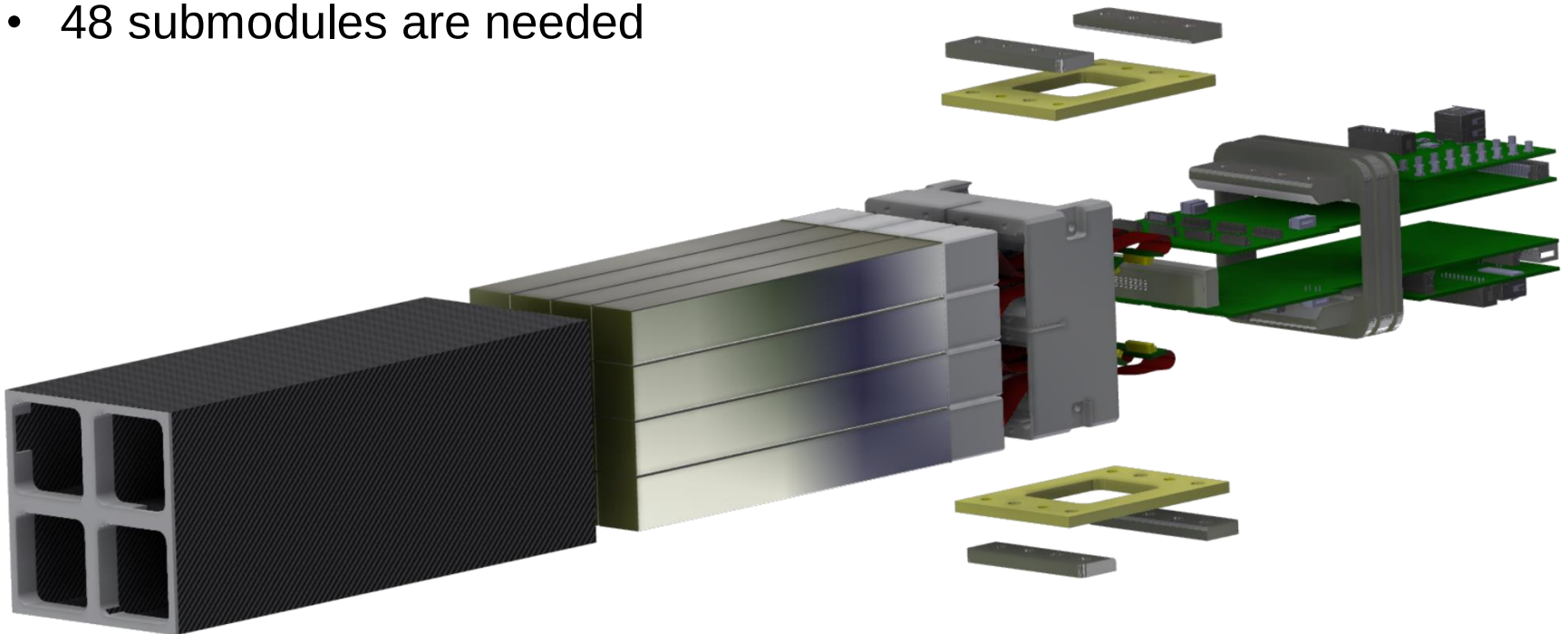
Submodule - Parts

- 16 Crystal units
- 2 Front-End boards
- 2 Service boards
- Alveolus
- Stopper
- Alu insert
- Holding parts
- 4 Temperature sensors
- Optical fibre assembly



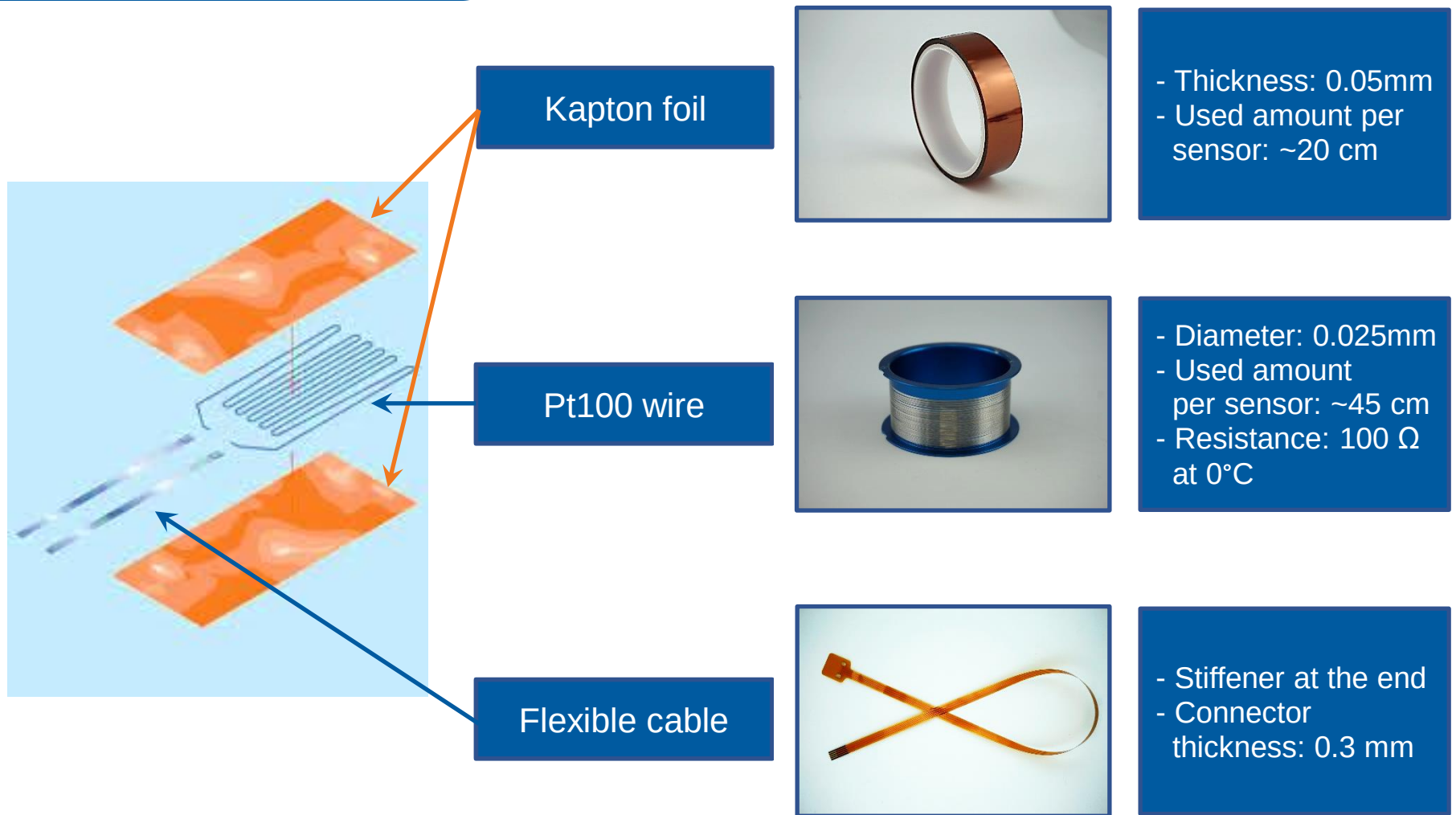
Assembly of a Submodule

- Mounting time for 16 crystal units: 2h 40min
- Submodule mounting time: 70 min
- Time needed for curing: 1 days
- 48 submodules are needed

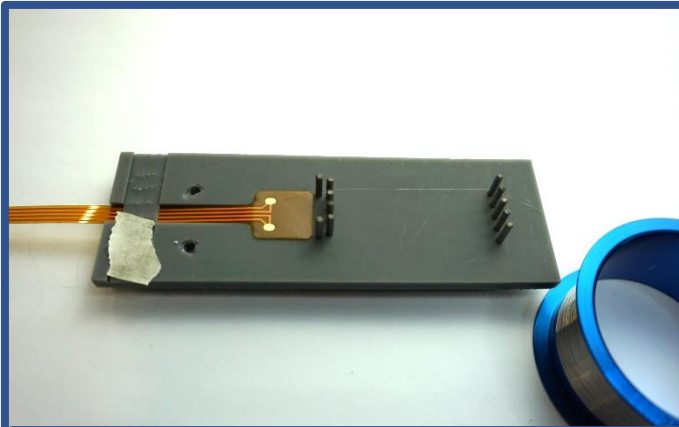


2. Ongoing Manufacturing

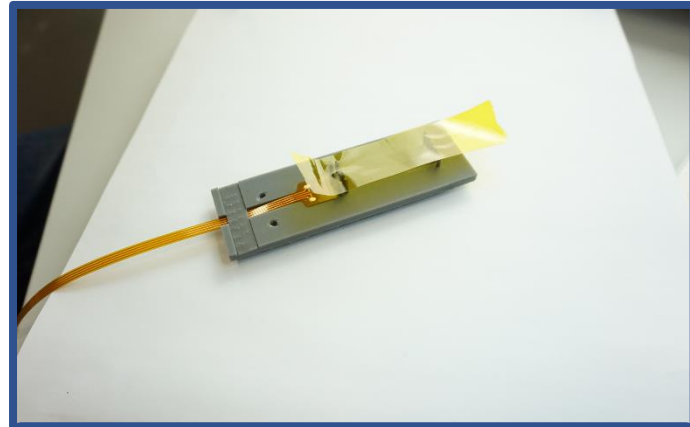
Temperature Sensor Production



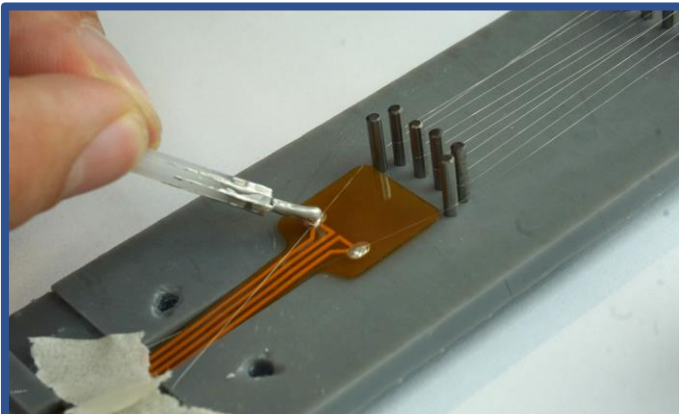
Temperature Sensor Production



Wrapping of the wire



Attaching the kapton foil



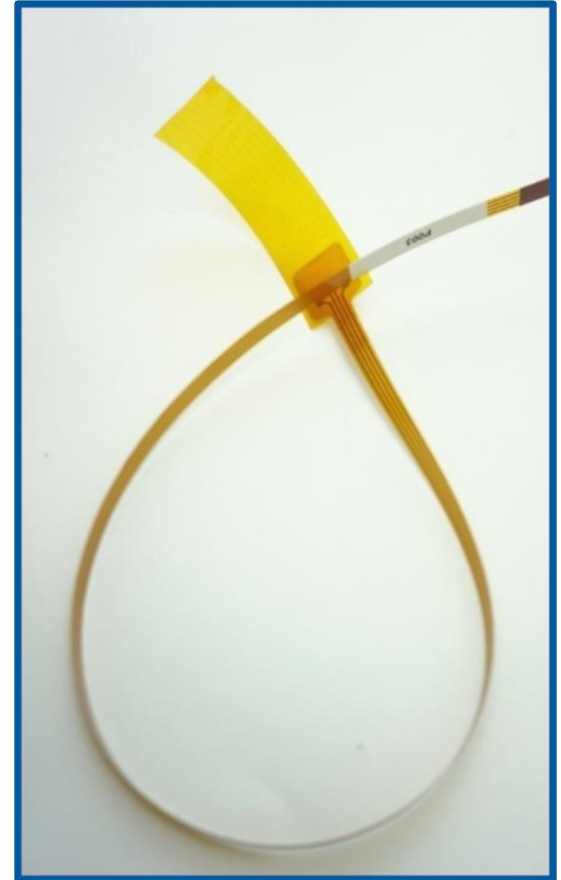
Gluing the Pt wire to the flex cable



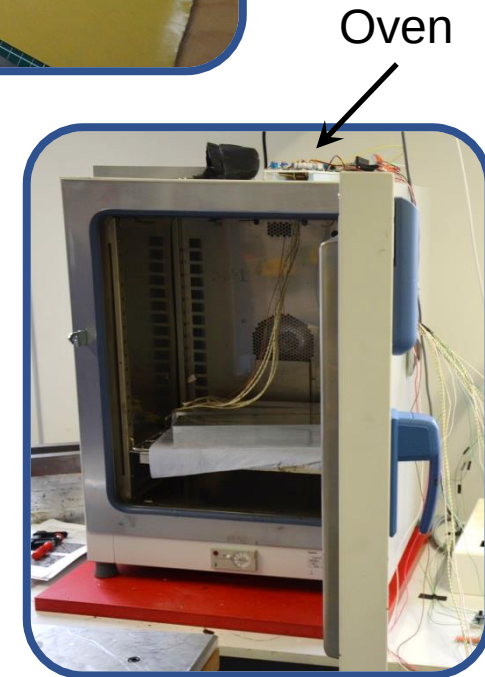
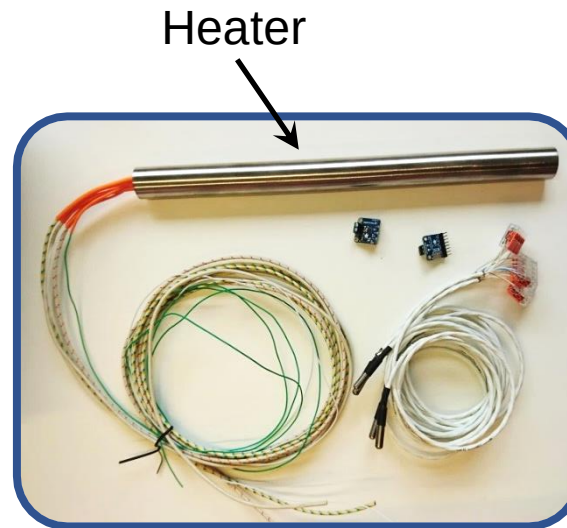
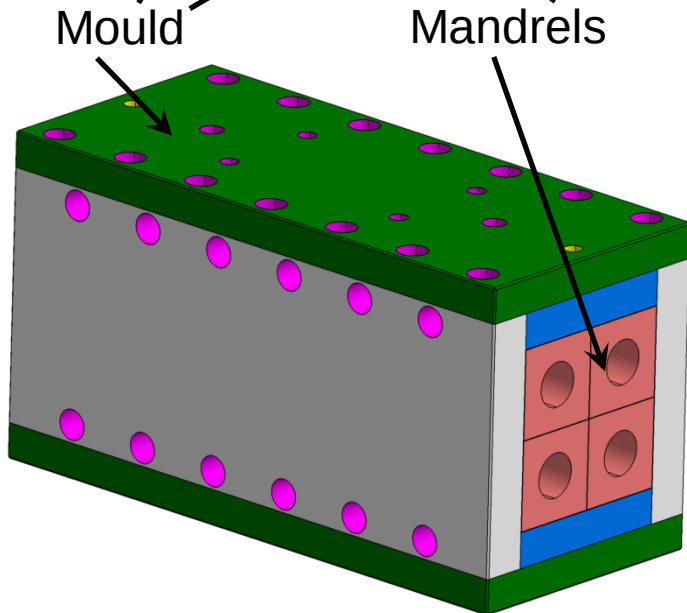
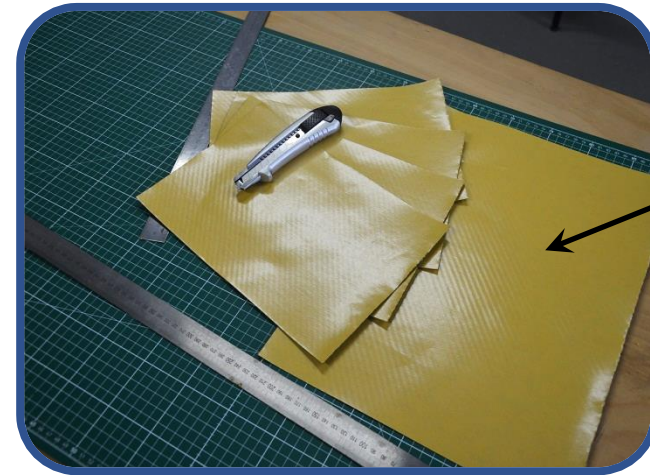
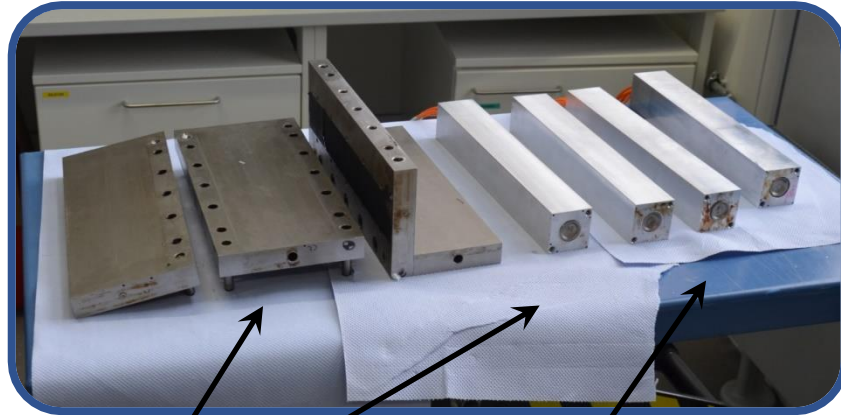
Detaching the kapton foils with the Pt wire

Temperature Sensor Production

- Production time: 20 min
- Thickness: $< 150 \mu\text{m}$
- Produced sensors: 160



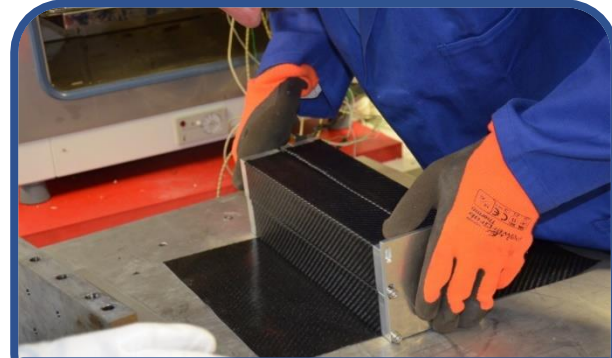
Alveoli Production



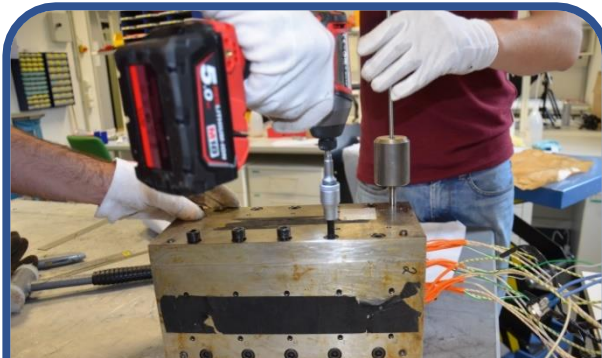
Alveoli Production



Wrapping mandrel with prepreg



Applying the outer layer



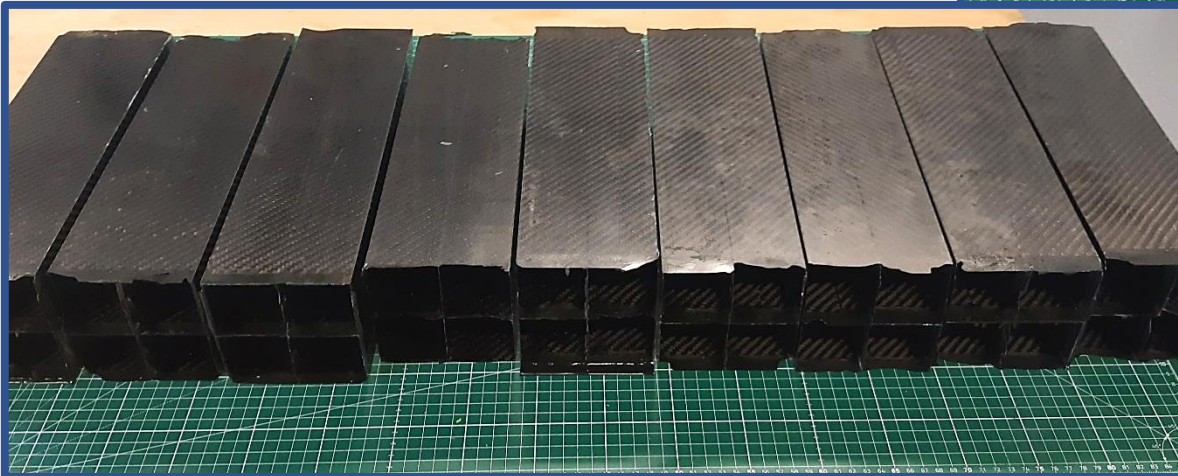
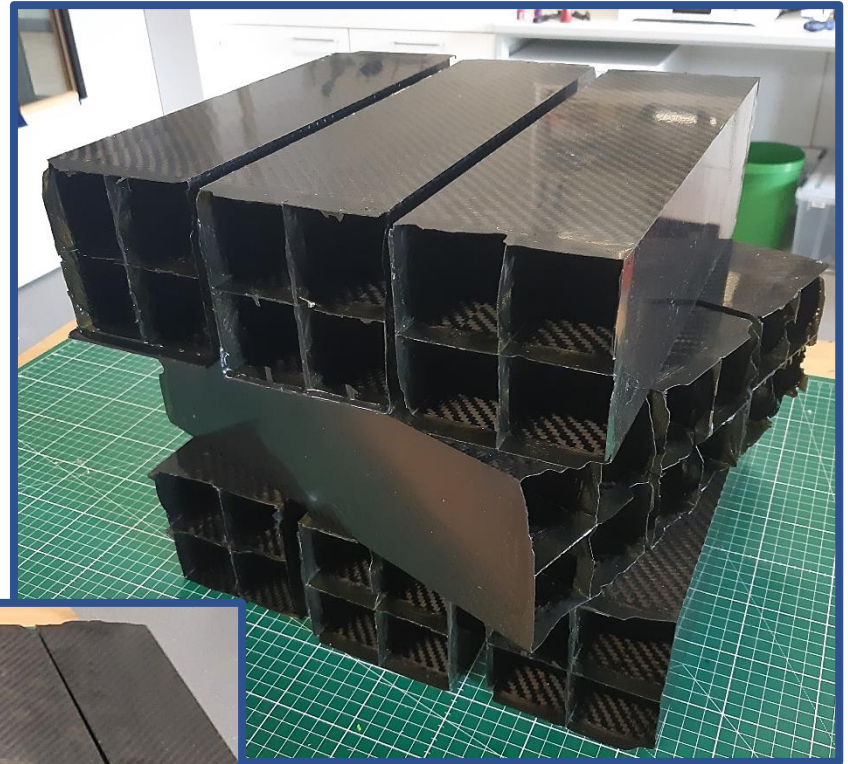
Closing the mould tight



Curing in the oven

Alveoli Production

- Production time with curing: 1 day
- Geometrical tolerance: 200 μ m
- Produced alveoli: 25
- Still pending: 23
- End of production: April



3. Current Status

Submodule Parts

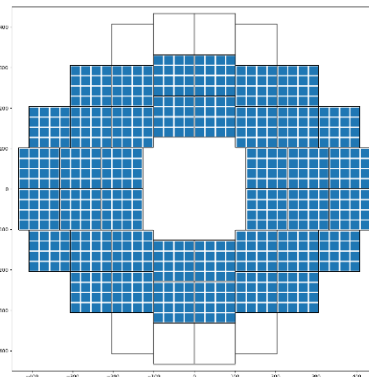
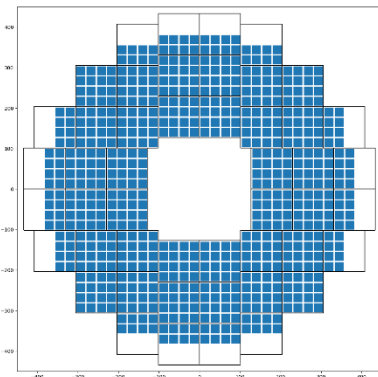
Part	Needed [#]	In Mainz [#]	Annotation
Crystal	640	614	66 in Gießen?
APD	1400 (incl. spares)	x	In Bochum, will be in Mainz in April
APFEL Boards	640	x	At GSI, assembling/tests ongoing
APFEL Alu Capsule	640	640 ✓	
Temperature sensor	160	160 ✓	
Front-End Board	96	x	PCB and components ordered
Alveolus	48	25	In production, 4 per week
Holding Parts	48	x	Will be ordered this month
Optical Fibre Assembly	48	x	First prototype ordered, Will be delivered in 2 weeks

Timeline Submodule Production

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Deliveries									
Part manufacturing									
Alveoli									
Temperature sensors									
Fibre bundles/ connectors									
Front-end boards									
Teststand Preparation									
Holding structures									
Light pulser									
Readout									
Mounting/testing									

Phase-0 Activities

- Letter of intent was submitted to the MAMI PAC on 5th of March
- First background estimations
- Simulation ongoing (acceptance, energy resolution, ...)
- 640 crystals will be used
- Two different shapes still possible
- Part production ongoing
- Expected start of detector submodule assembling: May 2020



Mainz Microtron MAMI

A1 Collaboration
Spokesperson: H. Merkel

Letter of Intent

Measurement of the Electromagnetic Transition Form Factor
of the π^0 in the space-like region via
Primakoff Electroproduction

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²Helmholtz-Institut Mainz, GSI Helmholtzzentrum für Schwerionenforschung GmbH

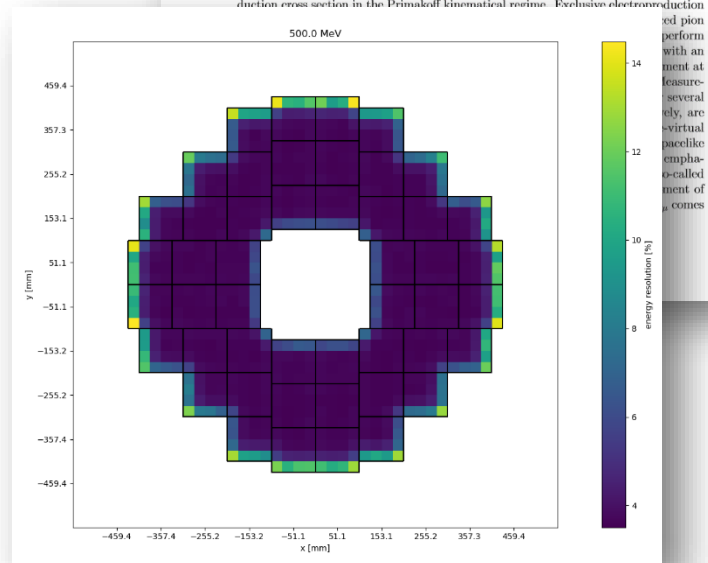
Contact persons:

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F. Maas (maas@uni-mainz.de)

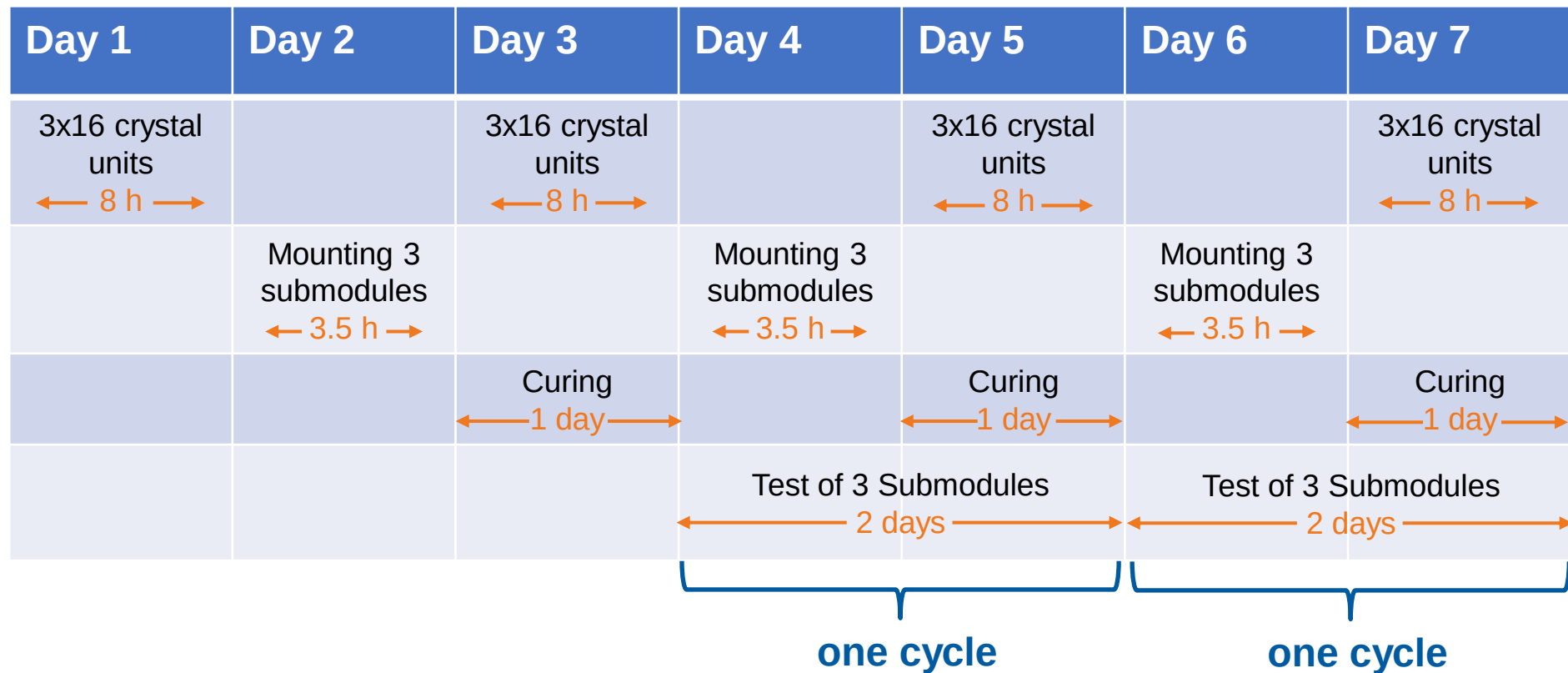
Abstract

We propose a determination of the pion transition form factor (TFF) $F_{\pi^0\gamma^*\gamma^*}$ with two spacelike virtual photons in the region of low Q^2 by a measurement of the π^0 electroproduction cross section in the Primakoff kinematical regime. Exclusive electroproduction of pion



Thank you for your attention

Submodule Production

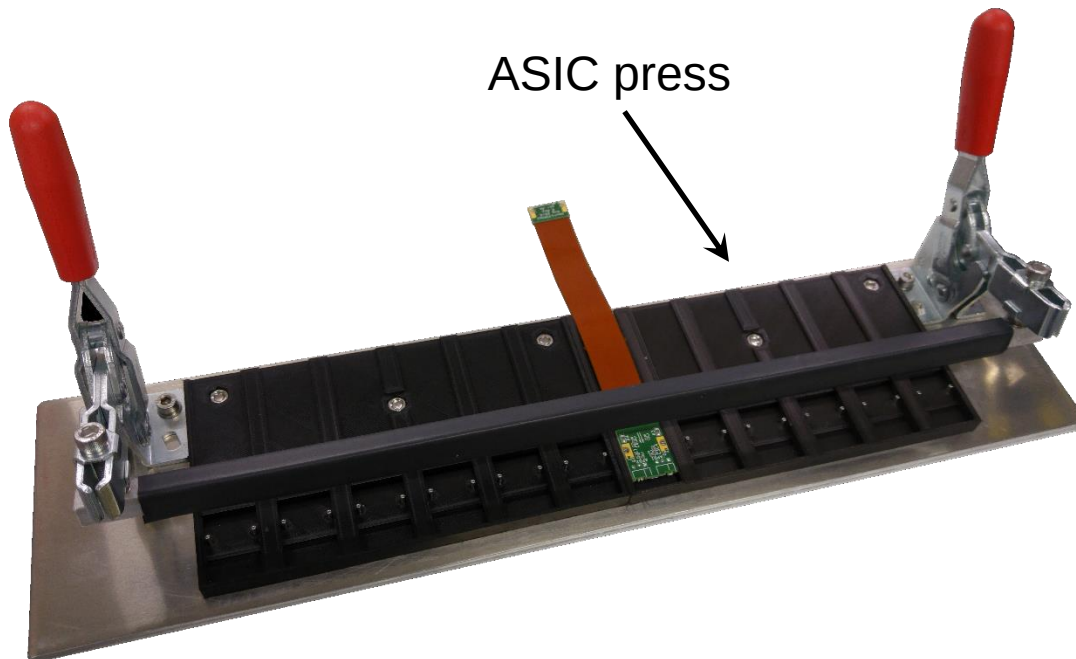


Crystal Unit Parts

Part	Needed [#]	In Mainz [#]	Annotation
Crystal	640	614	66 in Giessen
APD	1400 (incl. spares)	x	In Bochum, will be in Mainz in April
APFEL Boards	640	x	At GSI, assembling/tests ongoing
Reflective Foil	640	1000	
Heat Sink	640	700	
Thermal Pad	640	✓	Need to be cut
Optical Cookie	640	x	Will be delivered soon
APFEL Alu Capsule	640	✓	
APD Capsule	640	✓	

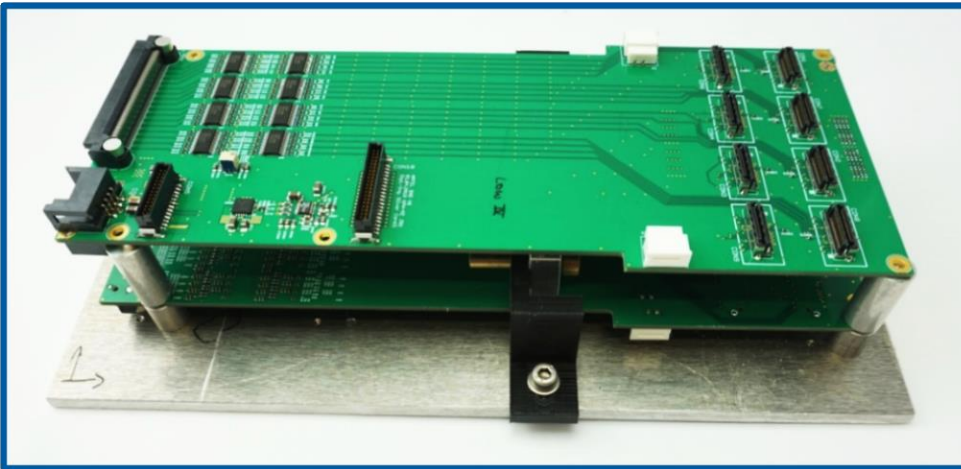
ASIC Press @ GSI

- GSI will solder the ASIC connector for us
- Soldering already started



Feedthrough Preparation

- Feedthrough and multi-fiber connector are glued together with intermediate fiber connector
- For detailed description see:
„Manufacturing procedures: FEE board”
by D. Rodríguez Piñeiro
- Working time: 1 h
- Time for curing: 24 h



Submodule Production

Procedure	Working time	Curing time
Alveolus Manufacturing	5h	1 night
Mounting 16 crystal units	4h	
Feedthrough preparation	1h	1 day
Optical Fiber Preparation	5h	1 day
Mounting of the Submodule	1h 35min	1 days
Production of one submodule	16h 53 min	
Production of 40 submodules	~660 h	