ERuM FSP-T06
Compressed Baryonic Matter

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Si-D Kick-off Meeting

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Joachim Stroth

IKF Institut für Kernphysik Frankfurt

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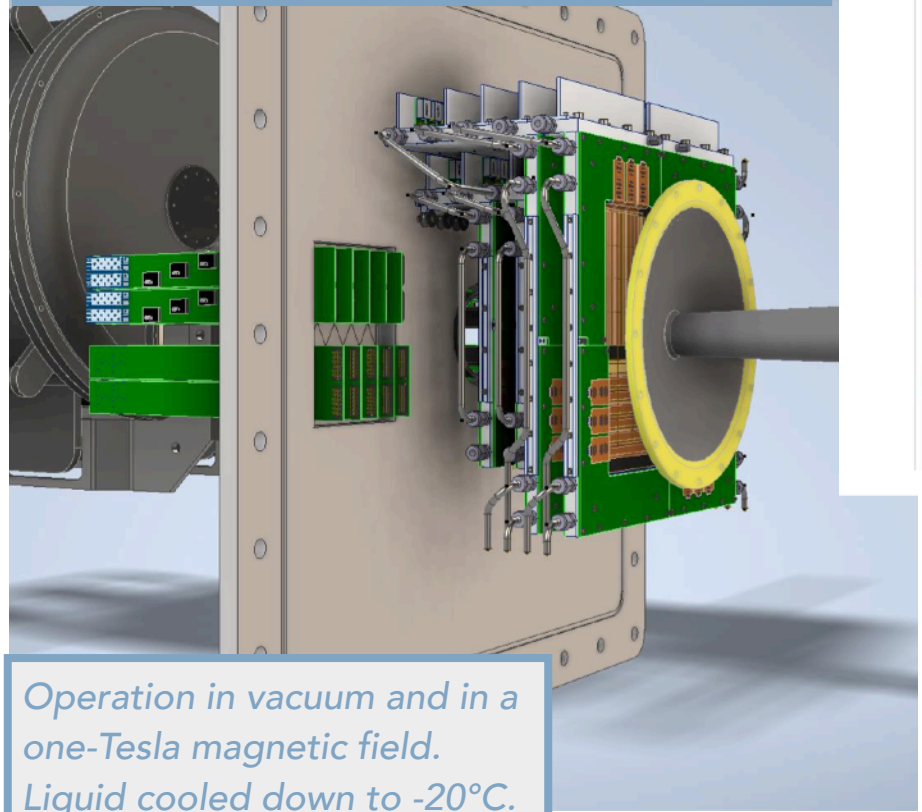
Compressed Baryonic Matter at FAIR

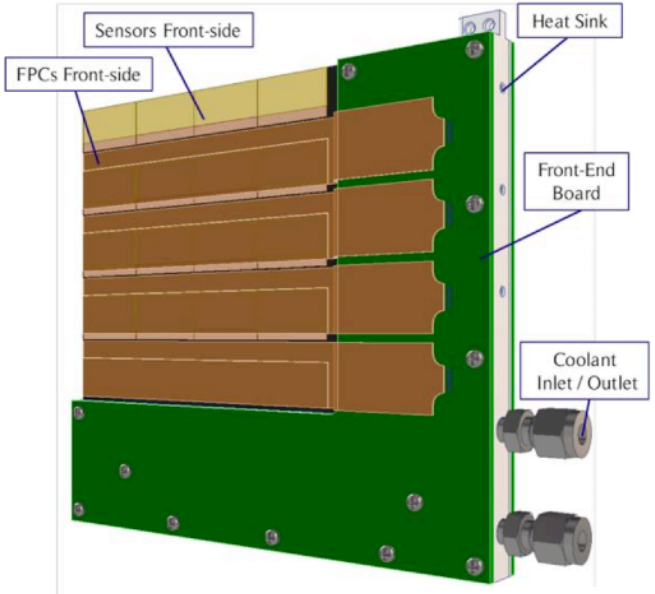
CBM and HADES at FAIR SIS100

MVD in a nutshell

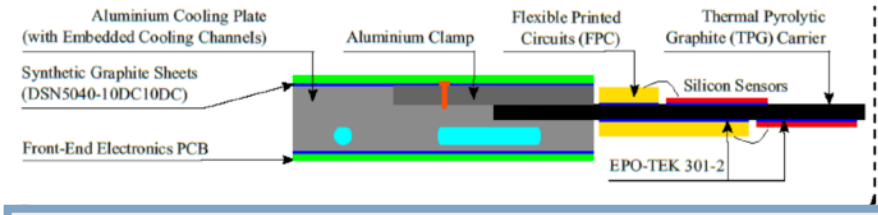
Four stations of MIMOSIS (CPS) sensors with 100% fill factor positioned close to the target



Operation in vacuum and in a one-Tesla magnetic field.
Liquid cooled down to -20°C.



Enhanced track reconstruction efficiency for tracks with low-momentum and factor ten improved vertex resolution over STS alone.

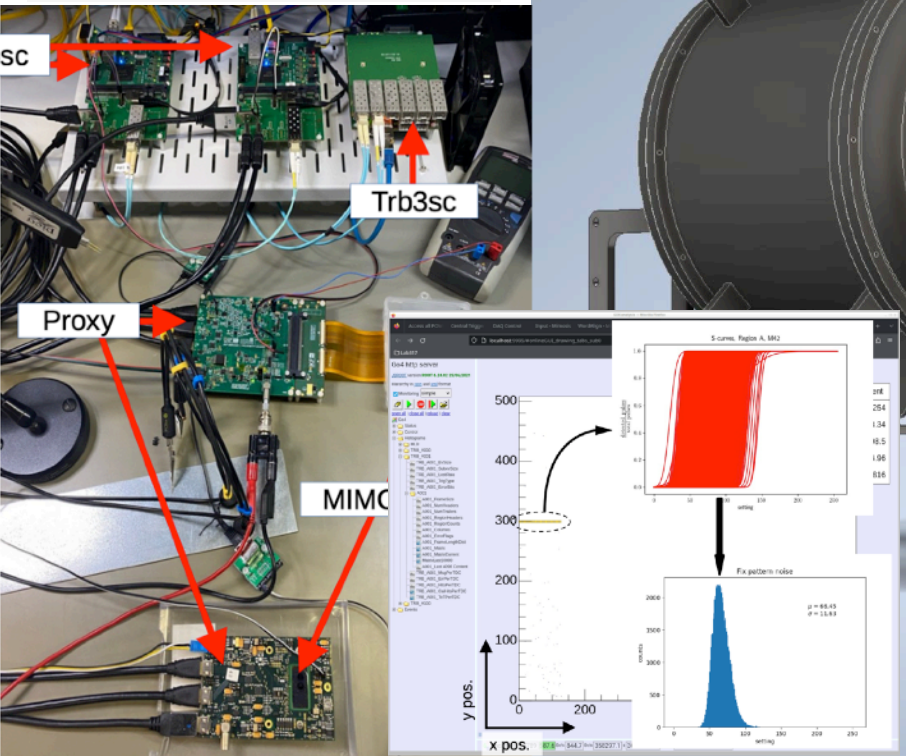


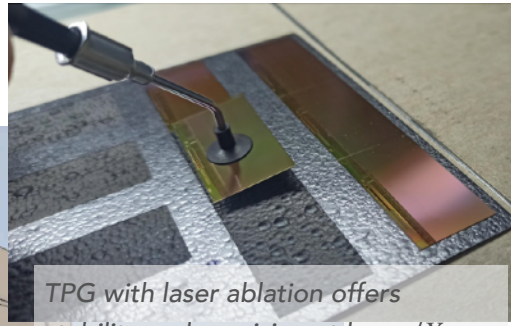
70 % heat extracted laterally, $0.2 - 0.5\ \% X_0$/station.
288 sensors, 148 M pixel, 200 kfps, $5\ \mu m$ precision.

MVD – Integration Concept Fully Developed

Major challenge: heat evacuation with minimal material budget and maximum stability

TRB based fast read-out system for sensor commissioning





TPG with laser ablation offers stability and precision at low x/X_0

Efficient heat exchange with customised cooling sink

Demonstrator for an Al-Metallised CVD-Diamond Sensor Carrier

Goal/Deliverable:

Developing a demonstrator to evaluate the feasibility of a CVD-Diamond based carrier which provides both support/ cooling and Aluminum traces/structures to read-out/control a M26 sensor mounted on the carrier.

Technological challenges:

- Metallisation of thermal grade polycrystalline CVD Diamond ($5\,\mu m$ thick Aluminum)
- Structuring of the metallised layer via lithography (typical feature sizes: $100\,\mu m$ trace width and separation)
- Wire bonding of traces/pads (manual, $20\,\mu m$ Al wire)

Participating institutions:

IKF/FB Physik Goethe-University Frankfurt (AG Prof. Dr. Stroth)
Diamond **M**aterials GmbH, Freiburg
(HSG-**IMIT**, Freiburg)

Preliminary Work Plan

Phase A

1. **KF**: provides to DM 4 thCVDD carriers (60 x 11 x 0.3 mm3) to exercise Al-metallisation (100% fill factor Al), these samples can be used by IKF for first bonding tests later.
2. **DM**: Metallisation tests on samples
3. **IKF**: provides the layout (Gerber) for the test structures (20 mm diameter, round shape)
4. **DM**: produces 2*) test structures according to the layout, comprising:
   1. thCVDD plate, round, 20 mm diameter
   2. Al-Metallization
   3. Mask (18 mm structured Al)
   4. Lithography
5. **IKF**: Bond tests, characterisation of the traces

Phase B

1. **DM**: Cutting/polishing (machining) of **2**
2. thCVDD plates, 22.4 x 55 mm2
3. , 0.2 mm thick
4. **DM**: Metallization (Al, 5 ?m)
5. **IKF**: Mask layout (Gerber)
6. **DM**: Mask
7. **DM** (IMIT): Lithography
8. **IKF**: Bonding