

MASSATI

DRD3

Monolithic Active Strip Sensors for Applications in future Tracking detectors & medical Imaging

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- This proposal is based on (and a continuation of) the successful planar CMOS strip project just presented by Iveta Zatocilova:
 - Planar (passive) strip CMOS sensors with multiple stitches perform as intended, are sufficiently radiation hard, and their behaviour is understood
- Silicon trackers now extend a meter or more from interaction point, with several 100m² area
- Current research focus on maximizing MAPS performance (radiation hardness, pitch, timing,...). We are interested in adapting MAPS for large-area use. Cost is major concern
- Our target: large scale, cost effective production of (strip/strixe) silicon in a CMOS Fab
- Natural evolution: stitching demonstrated => now include ASIC functionality on sensor

The Proposal

- Technology:
 - LFoundry 150 nm CMOS (known, current prototypes)
 - LFoundry 110 nm CMOS
- Move from passive to active sensor (plan to use elements of FEI4), but no stitching this time as this is demonstrated already
- We are not aiming for cutting edge maximum performance! Instead, we seek cost-effective production processes, reduced power consumption (reduced cooling requirements)
- Aim for adequate and affordable performance in outer layers, paving way for widespread deployment of monolithic sensors in future detectors



- Funding Status: only partially funded so far (in-house University funds, BMBF, and Helmholtz (DESY))
- Participants so far:
University of Bonn,
DESY,
TU Dortmund,
FH Dortmund,
University of Freiburg.
- We are open to new participants

Draft Time Line

- 2 submissions planned:
- Q2 2025 and Q3 2027

| Number | Deliverable/Milestone Title | WP project # | Lead | Type | Dissemination Level | Due Date |
|--------|--------------------------------------------------------|--------------|-------------------|-----------|---------------------------|--------------------|
| M1 | Summary report on previous work on passive CMOS Strips | 4 | U Freiburg / DESY | Report | Publication | Month 3 (Q1 2025) |
| D1 | <i>Submission of first small-scale prototype</i> | 1, 2 | FH Dortmund | Prototype | Manual / Presentation | Month 6 (Q2 2025) |
| M2 | <i>Report on prototype performance</i> | 3, 4 | U Freiburg | Report | DRD3 report / publication | Month 18 (Q2 2026) |
| D2 | <i>Submission of second full-size prototype</i> | 1, 2 | FH Dortmund | Prototype | Manual / Presentation | Month 30 (Q2 2027) |
| M2 | <i>Report on full-size prototype</i> | 3, 4 | U Freiburg | Report | | Month 39 (Q1 2028) |