

JRA1 Status: PCMAG, Testbeam Infrastructure and Pixel Telescope

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DESY/F1

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This Talk

- JRA1 Organization and Planning
- Magnet
- Telescope
- Test beam campaigns
- Next steps
- Personnel

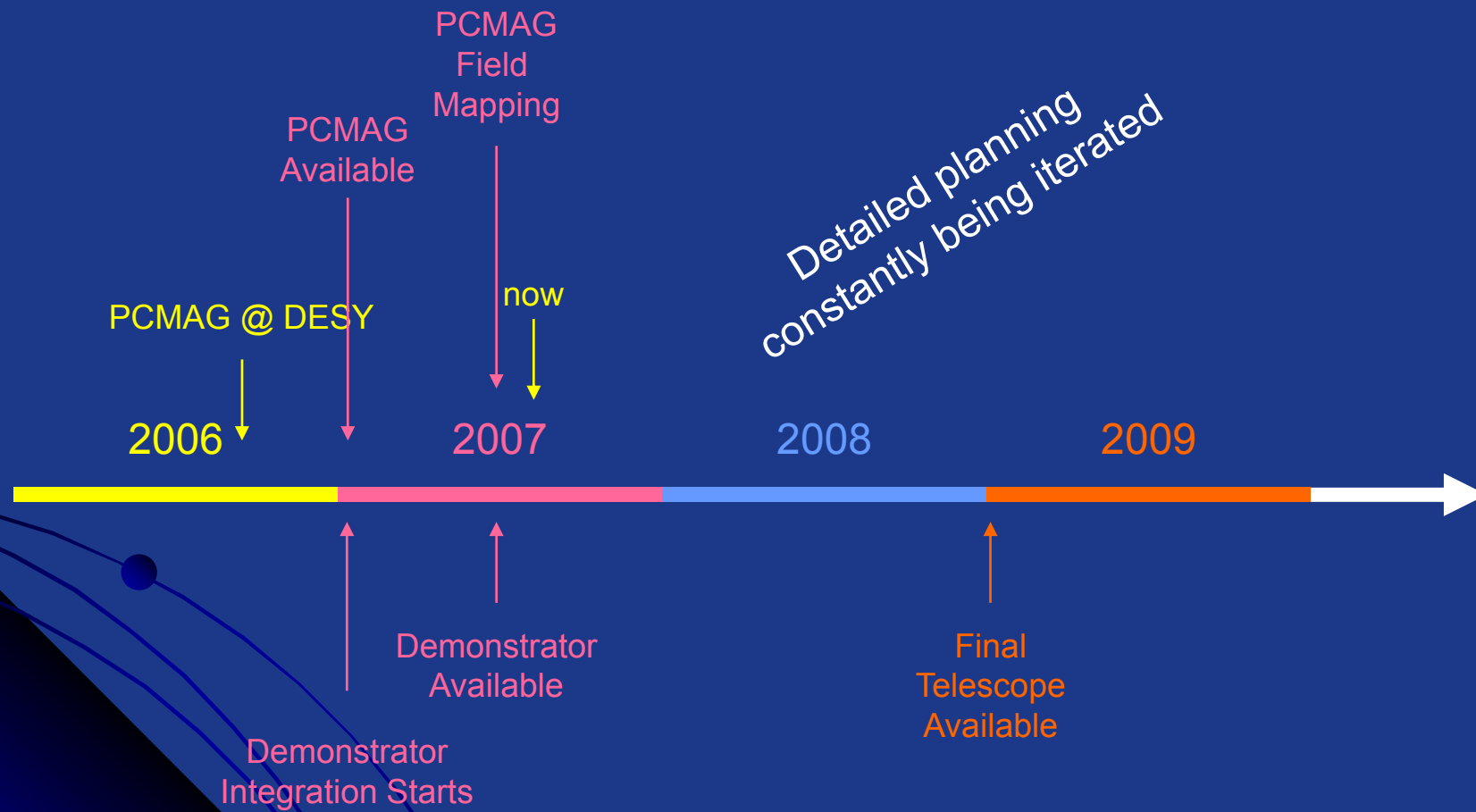
JRA1

- General Purpose Test beam infrastructure
 - DESY Test beam
 - PCMAG
- Pixel telescope
 - high precision ($\sim 1 \mu\text{m}$ even in a 6 GeV/c electron beam)
 - reasonably large area ($\sim 1 - 2 \text{ cm}$)
 - Fast readout ($\sim 1\text{kHz}$ frame rate) to handle higher rate environments

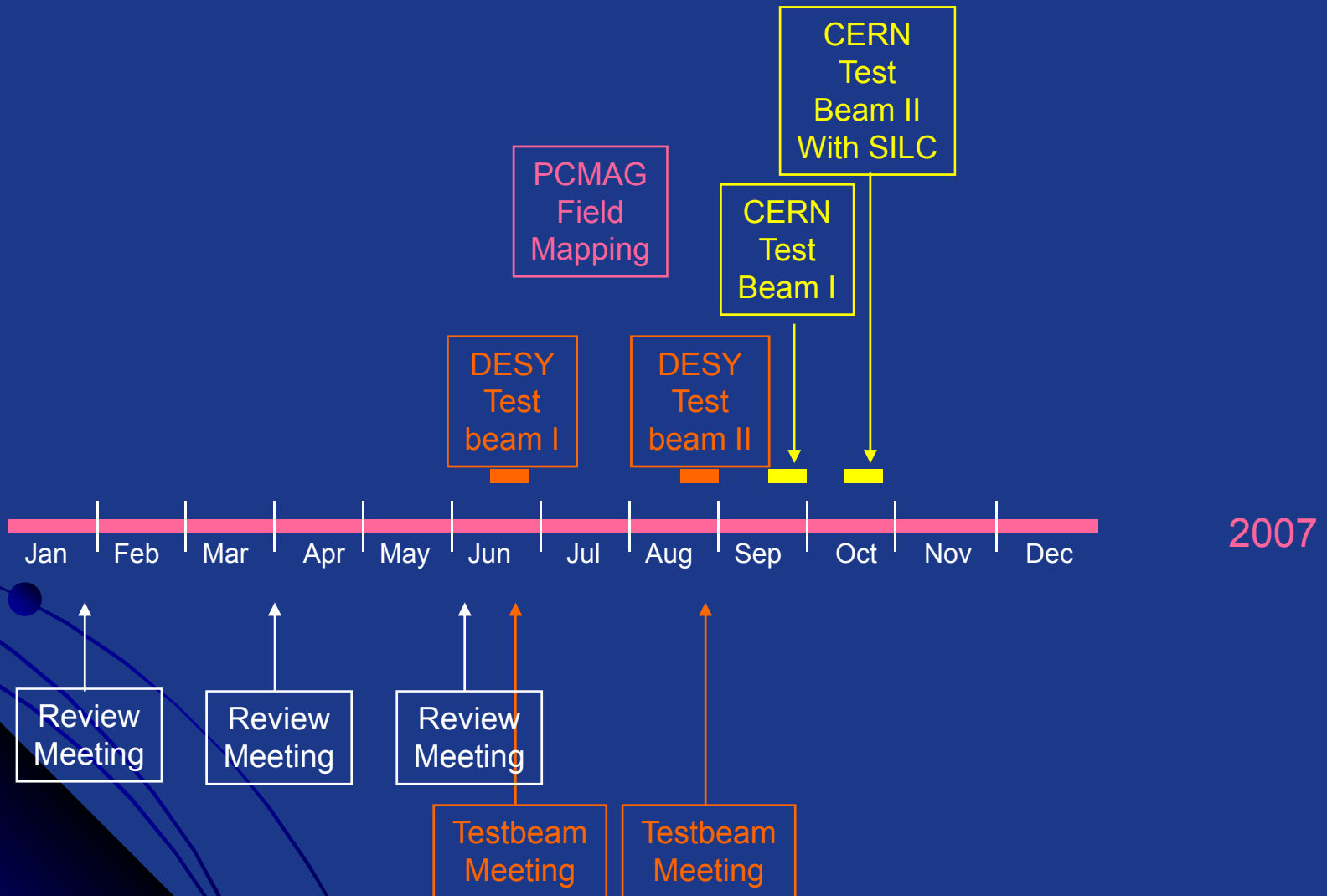
Staged Implementation

- Demonstrator telescope with slightly less precision and slower R/O (analog pixel sensor)
- Final telescope with high precision and high rate (pixel sensor with ADC and data reduction on chip)

Current Planning



This Year

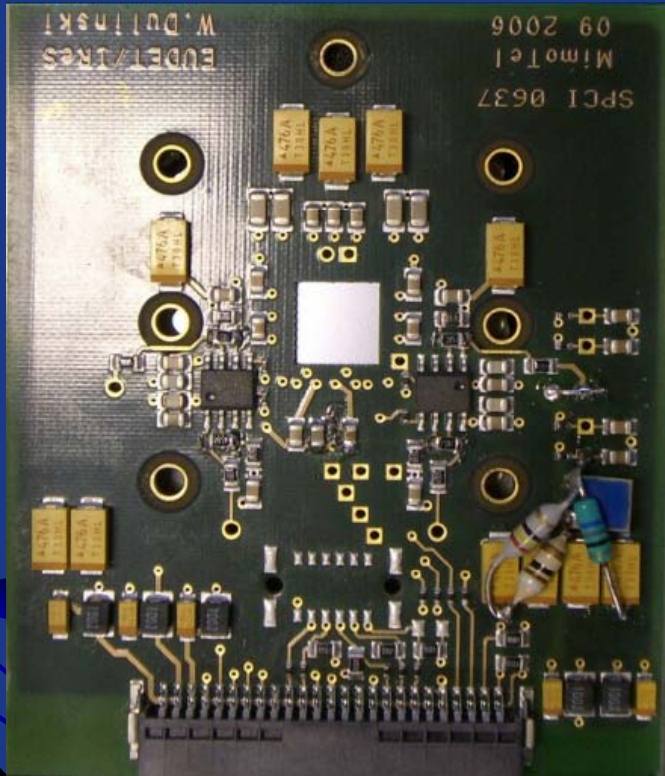


PCMAG Field Mapping July

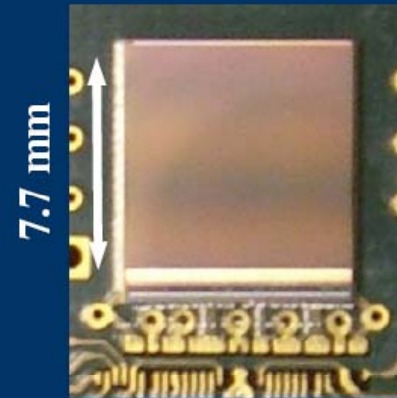


More details → [Lucie Linssen](#)

Telescope sensors



- MimoStar 3M
- 256 * 256 pixels
- 30 μm x 30 μm pitch
- Self biased structure
- 10 MHz clock
- Epi thickness 20 and 14 μm
- Total thickness 700 μm



Test Beam Campaigns

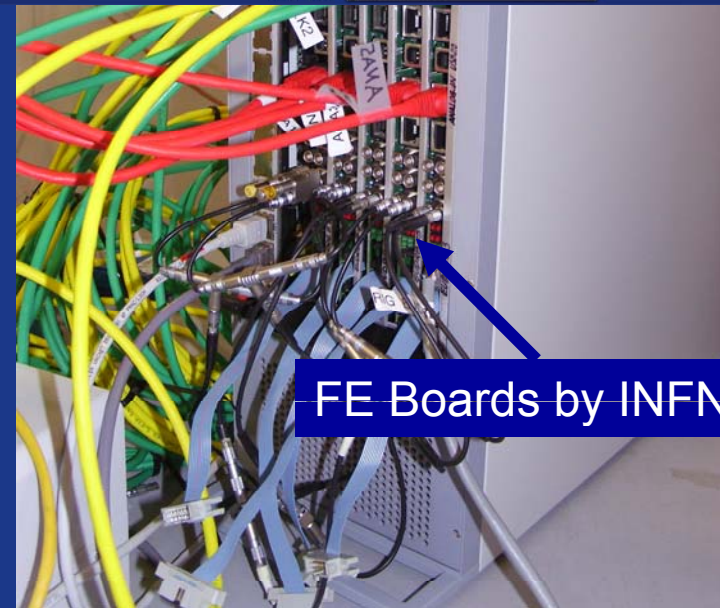
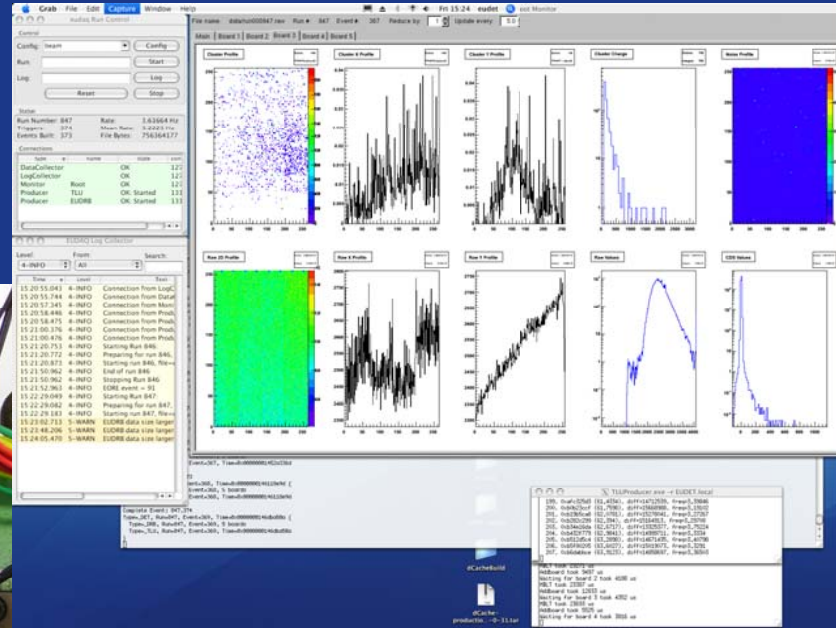
- June 2007: DESY
 - Commissioning, First beams
- August 2007: DESY
 - Full system, First results
- September 2007: SPS @ CERN
 - Demonstrate the performance:
 - Speed
 - Precision

DAQ by Geneva

Sensors etc by IRES

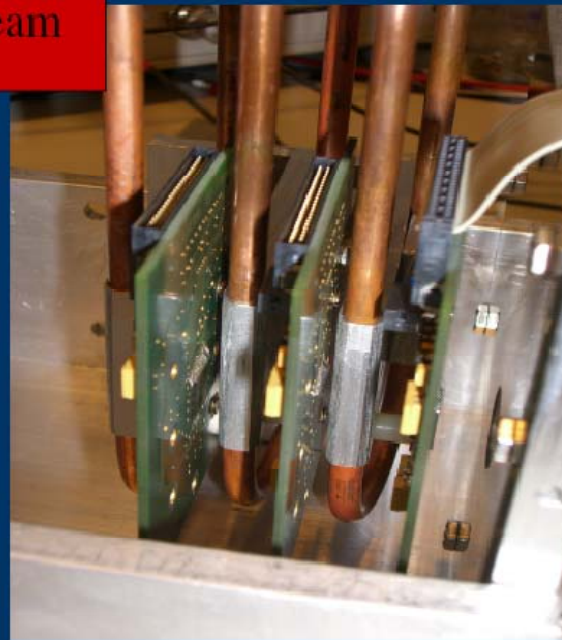
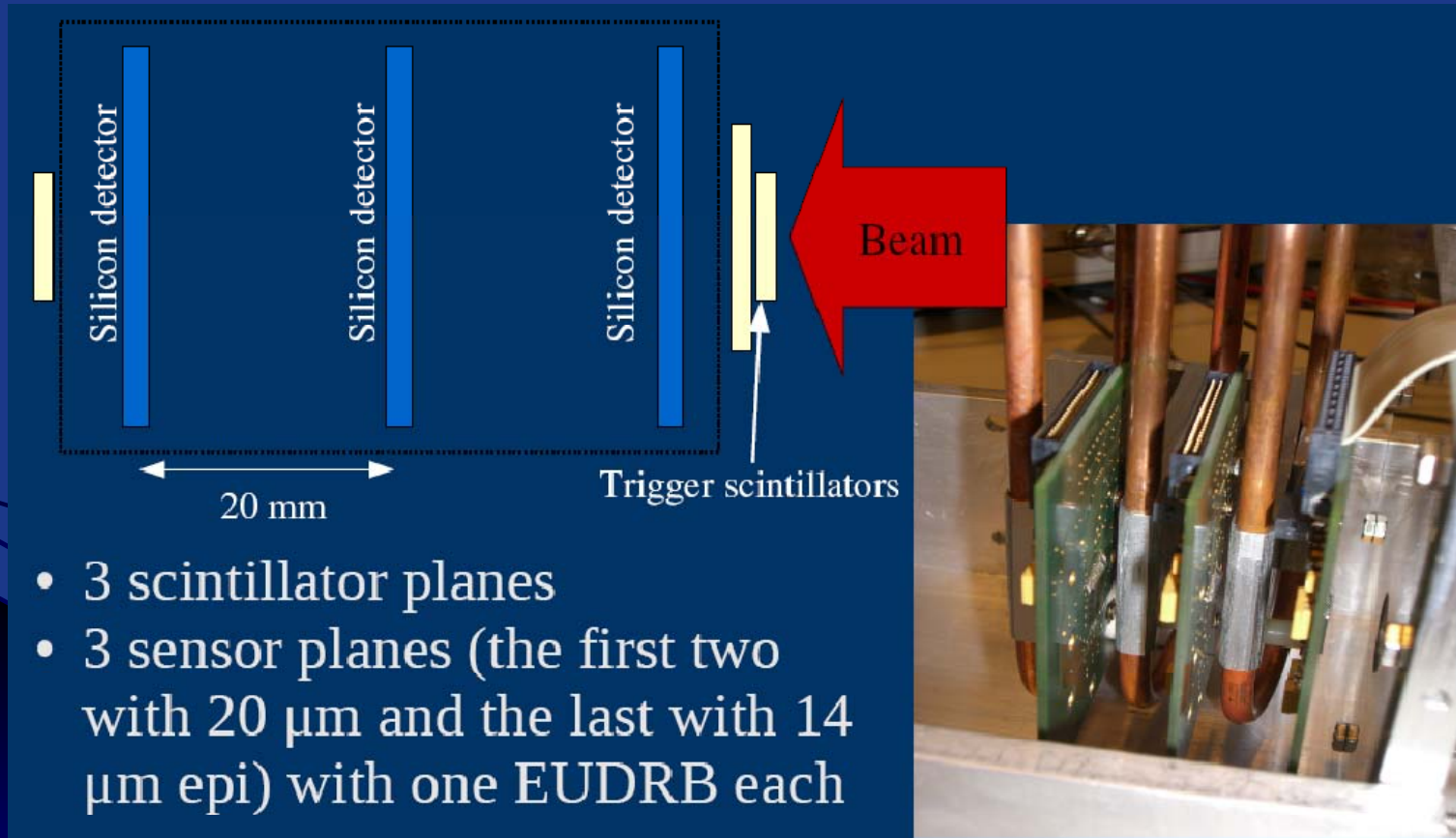


Mechanics/Cooling by DESY



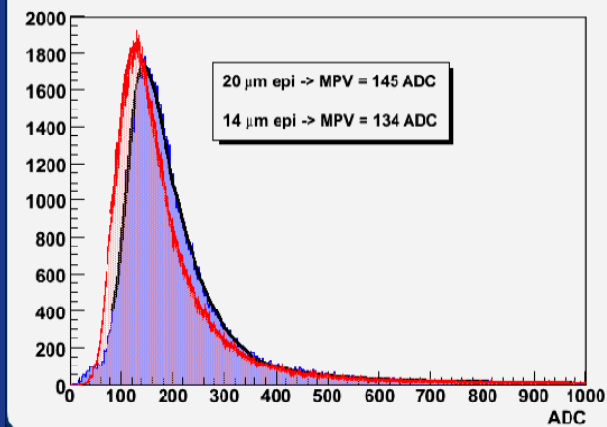
FE Boards by INFN

DESY Test beam I

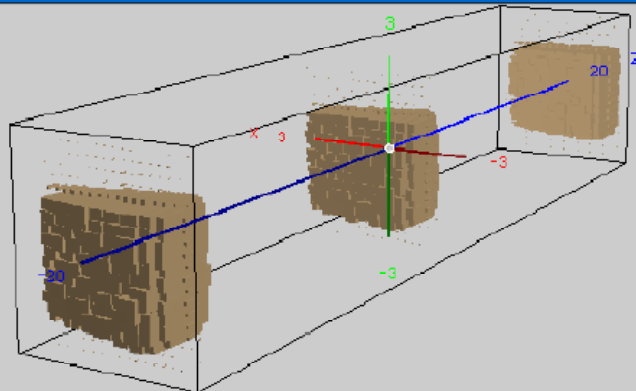


DESY Test beam I

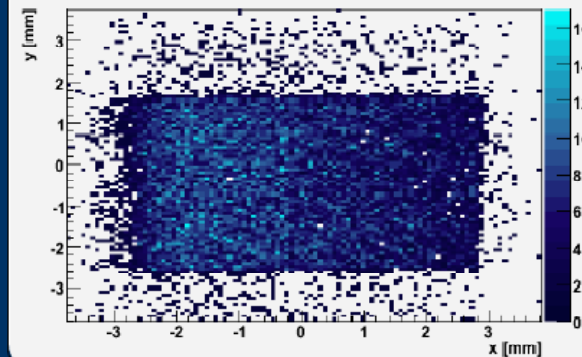
3x3 cluster signal distributions



Single track 3D hit map



First plane hit map



DESY Test beam II

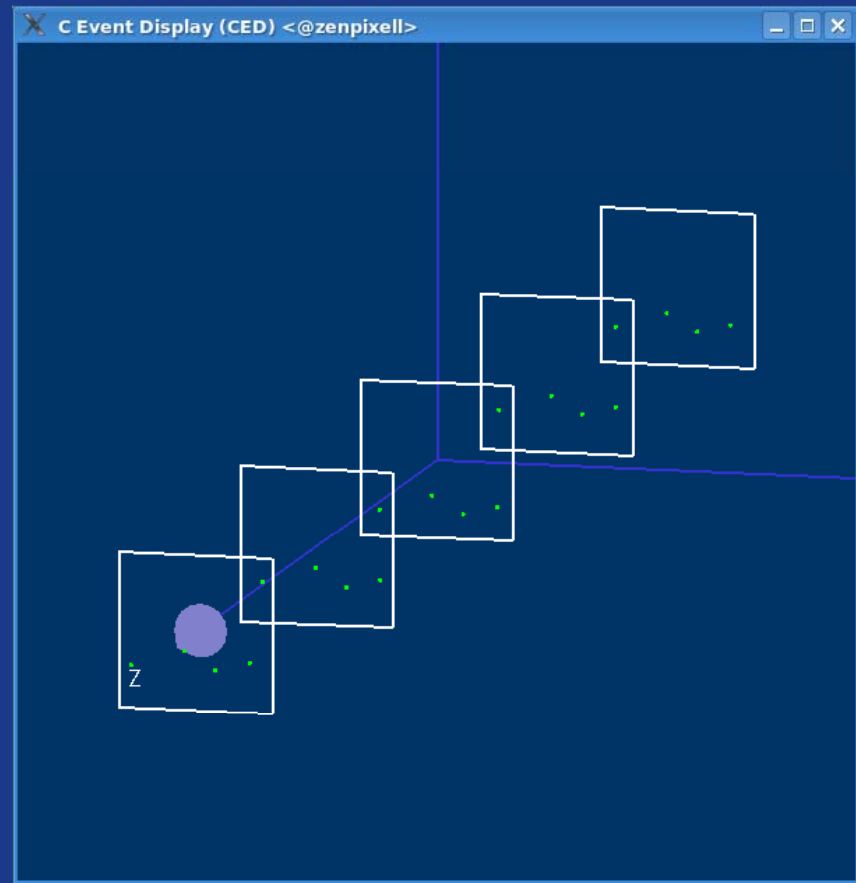
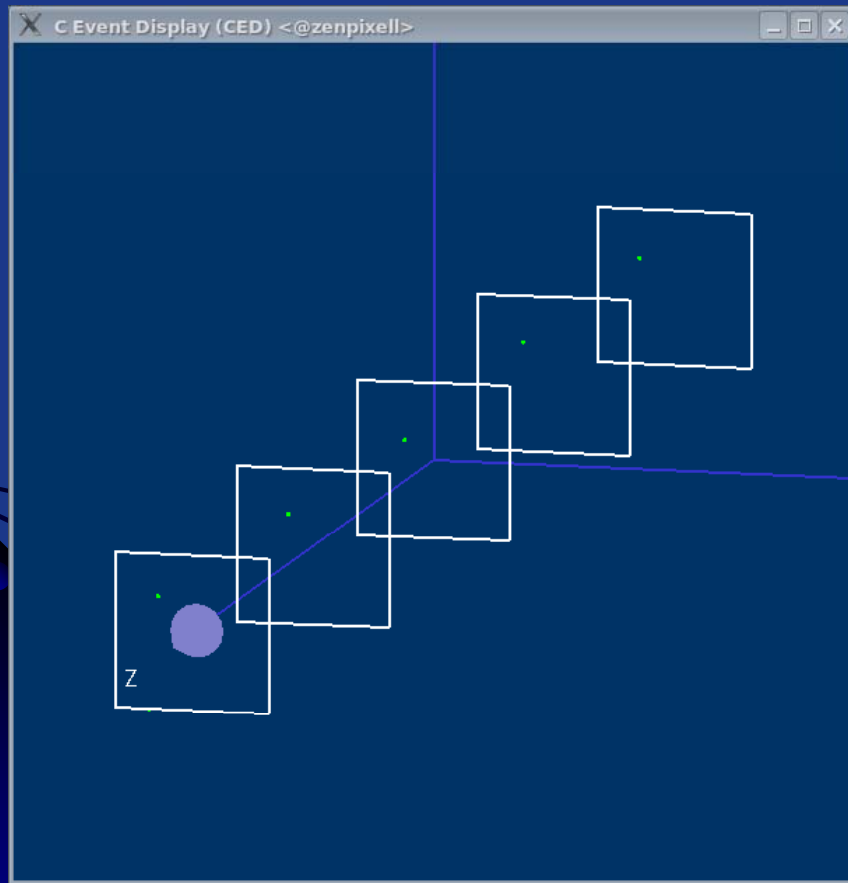


More details → Ingrid Gregor

DESY Test beam II



DESY Test beam II



EU Personnel

- DESY:
 - Need a replacement for Julia Fourletova, who has just left.
- Geneva:
 - Emlyn Corrin
- Bonn
 - Lars Reuen, student
- MPI
 - Stefan Rummel, student
- CERN
 - Jerome Alozy, student

Other people

- DESY:
 - Tatsiana Klimkovich (postdoc) will leave end September
 - Philipp Roloff (student) will work on data analysis
- Geneva
 - Daniel Haas leaves
- INFN
 - Marcin Jastrzab (student) will work on FPGA programming
 - Antonio Bulgheroni will go to Como and work on the software

Organizational

- T. Haas → steps down as JRA1 coor
- Proposal:
 - I. Gregor takes over
- 50k money for hw to be spent on various HW at DESY → Geneva
 - Pay for parts of Daniel Haas to continue
- SiLC has requested a common TB in October
 - Need to organize!

Milestones/Deliverables

Milestone	Date	Task
SDC prototype 1 ready	9	C
Magnet available	12	A
SDC prototype 2 ready	15	C
Field map available	18	A
Analogue Telescope integrated in beam	18	B
Readout for prototype available	18	D
IDC prototype ready	27	C
Final Pixel telescope integrated in beam	36	B
TC ready	36	C
Final readout ready	36	D
Tracking software available	36	D
Test report Analogue Telescope available	36	E
Final project reports	48	A,B,C,D,E



Deliverable No	Deliverable title	Task	Lead Contractor(s)	Deliverable date	Nature
JRA1-D1	SDC prototype 1	C	CNRS-IReS	9	Prototype
JRA1-D2	SDC prototype 2	C	CNRS-IReS	15	Prototype
JRA1-D3	Field map	A	CERN	18	Software
JRA1-D4	Analogue prototype telescope	B,C,D	DESY, UNI-GE, CNRS-IReS	18	Hardware
JRA1-D5	IDC prototype	C	CNRS-IReS	27	Prototype
JRA1-D6	Test report Analogue Telescope	E	MPS-MPI	36	Report
JRA1-D7	Final telescope	B,C,D	DESY, UNI-GE, CNRS-IReS	36	Hardware
JRA1-D8	Final report	A,B,C,D,E	CNRS-IReS, DESY, UNI-GE, MPI	48	Report

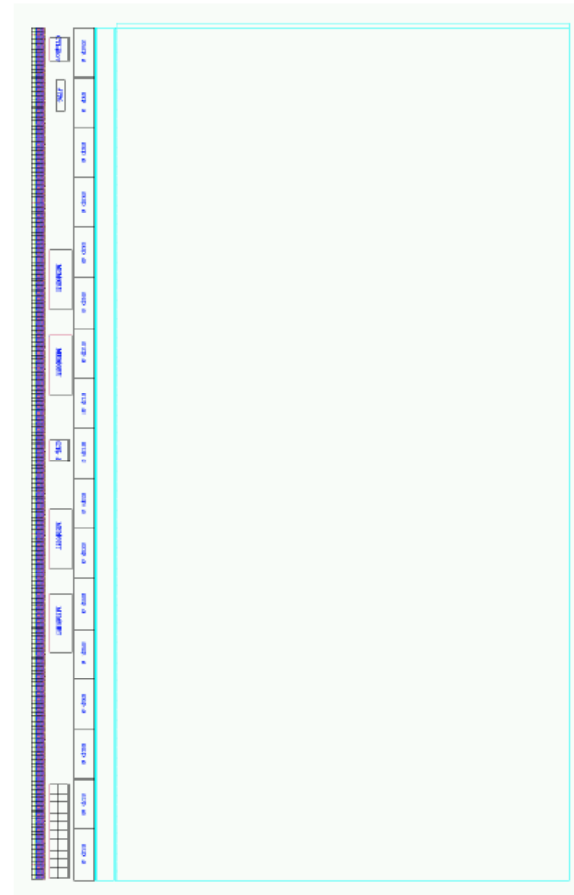
Next major milestone: Intermediate Digital Chip (MIMOSA 22+)

■ Spring 2008 : MIMOSA-22+

- * MIMOSA-22 complemented with \emptyset (SUZE-01)
- * 1 or 2 sub-arrays (best pixel architectures of MIMOSA-22)
- * larger surface : active surface $\sim 0.5 \text{ cm}^2$
 - $\hat{=}$ final column depth (576 pixels)
 - $\hat{=}$ $\gtrsim 1/4$ of final number of columns ($\geq 256 / 1088$)
- * total surface $\lesssim 5.5 \times 12 \text{ mm}^2 \rightarrow 50 - 55 \text{ keuros}$
 - \hookrightarrow available funding : EUDET (27 keuros) & STAR/CBM (rest)
- ▶ opportunity for engineering run (100 keuros) combining various chips

■ End 2008 / early 2009 : Final chip

- * Extension of MIMOSA-22+
- * Active surface : 1088 columns of 576 pixels ($20.0 \times 10.5 \text{ mm}^2$)
- * Read-out time $\gtrsim 100 \mu\text{s}$
- * Chip dimensions : $20 \times 12 \text{ mm}^2$
- * Engineering run : $\sim 120 \text{ keuros}$ for 6 diced and thinned wafers
 - \hookrightarrow available funding : EUDET (70 keuros) & STAR/CBM (50 keuros)



Marc Winter

Summary

- JRA1 is well on track
 - Various test beam campaigns successful
 - Demonstrator telescope basically ready
 - PCMAG Mapping done
- Next major milestones:
 - Intermediate digital chip (MIMOSA 22+)