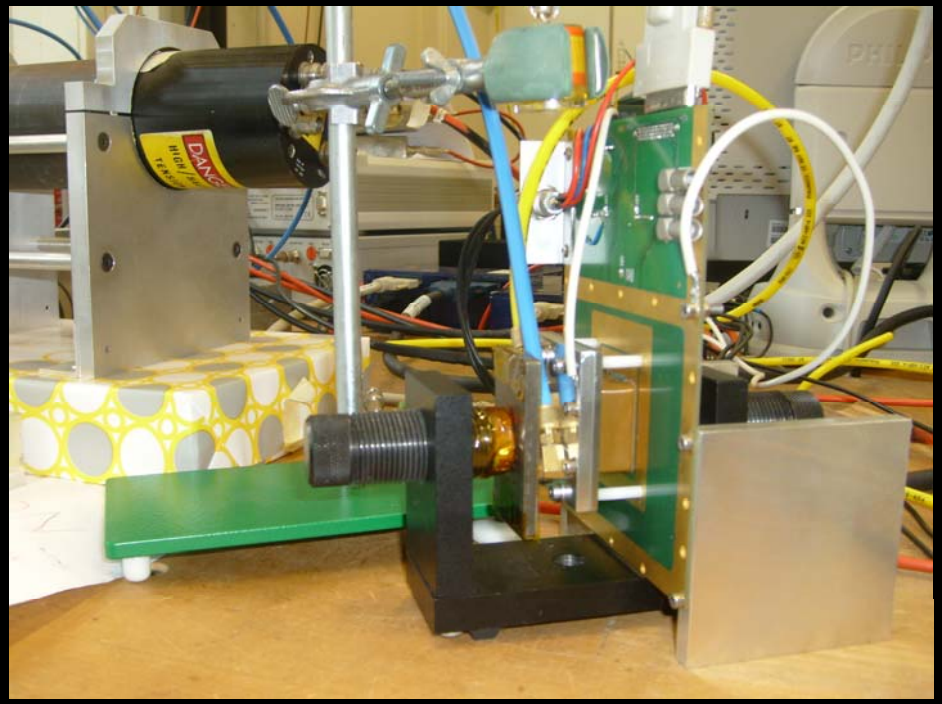
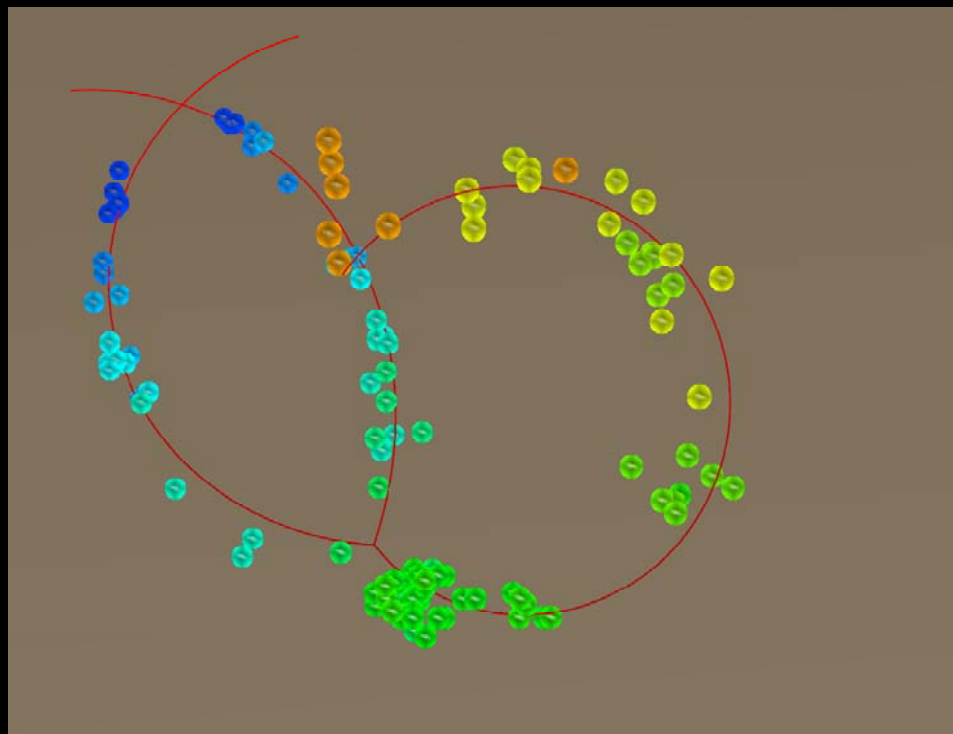
Various GridPix related issues_

Harry van der Graaf
Detector R & D, Nikhef
RD51 Week, April 29, 2009



Internal Conversion decay of ^{24}Na

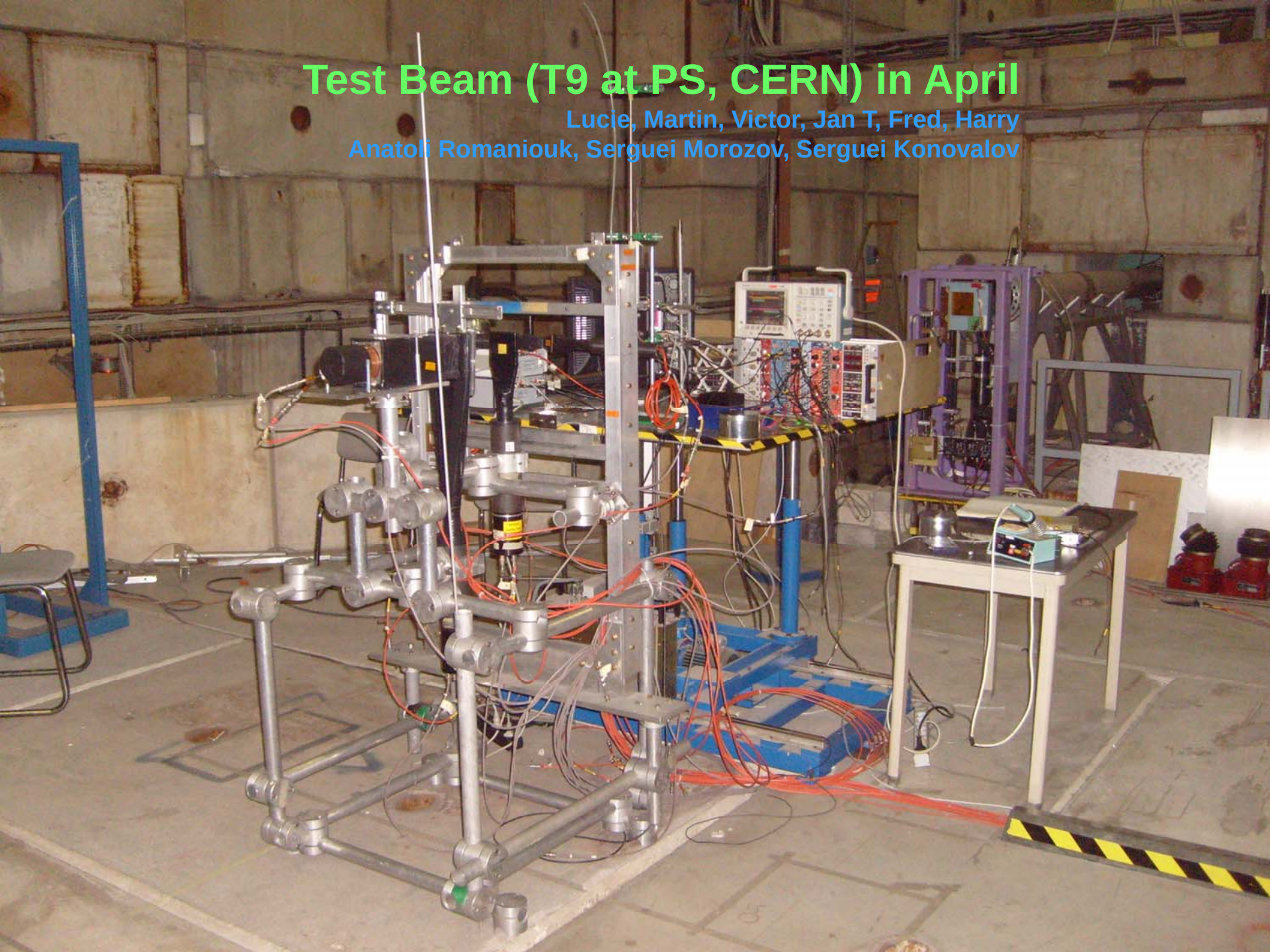


Fokke, Tjeerd, Jan T., Lucie, Wout, Martin,
Joop K.,
Aad vd Kooij
Arie Taal
Wim Lourens
Pieter Dorenbos

Constructed by Hans B., Joop R, Wim G.,
Berend M, Arnold R., Michiel J., Edward B.,

Test Beam (T9 at PS, CERN) in April

Lucie, Martin, Victor, Jan T, Fred, Harry
Anatoli Romaniouk, Serguei Morozov, Serguei Konovalov



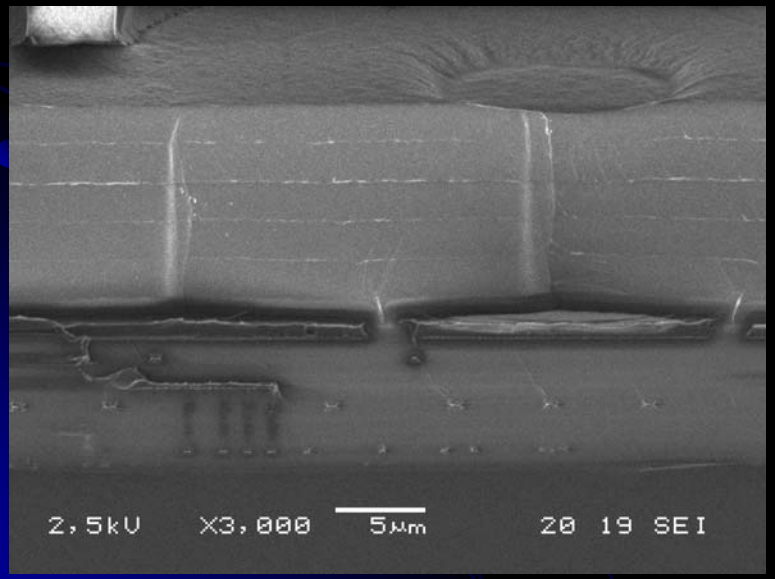
July 2008: protection layer made of Si_3N_4 (Silicon Nitride), only 7 µm thick

$$3\ SiH_4 + 4\ NH_3 \rightarrow Si_3N_4 + 12\ H_2$$

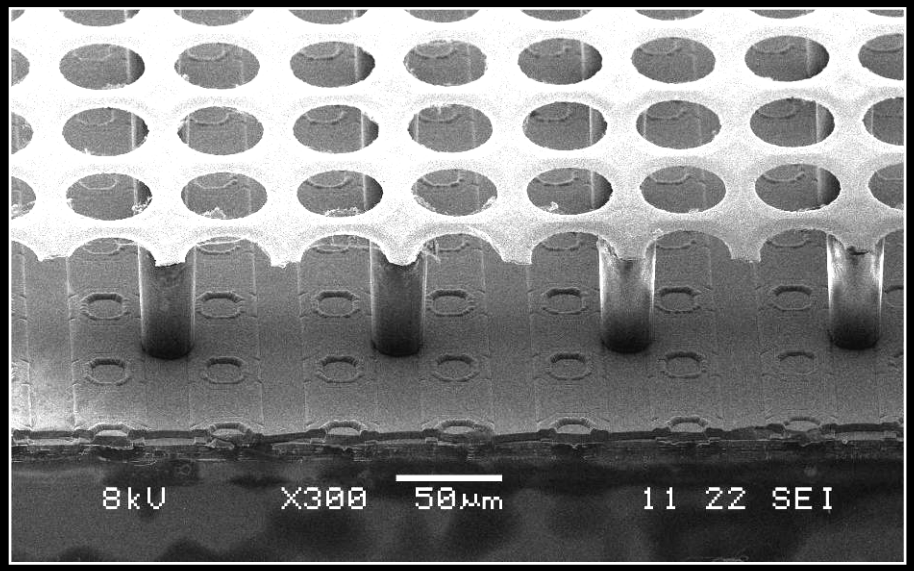
- Silicon Nitride is often applied as passivation layer: top finish of chips.

- With overdose of SiH_4:conductivity: high resistivity bulk material

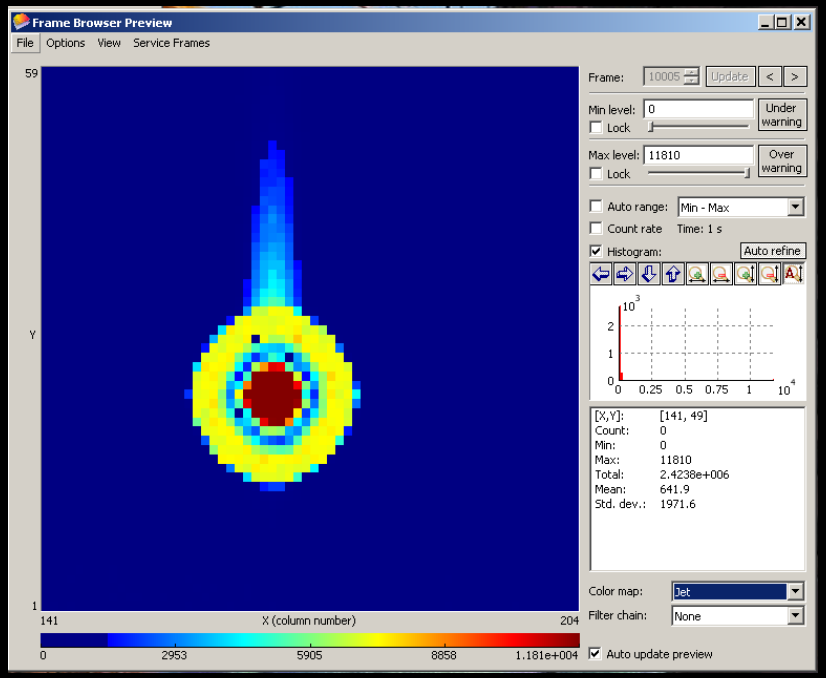
- Favored material for bearings in turbo chargers, jet engines

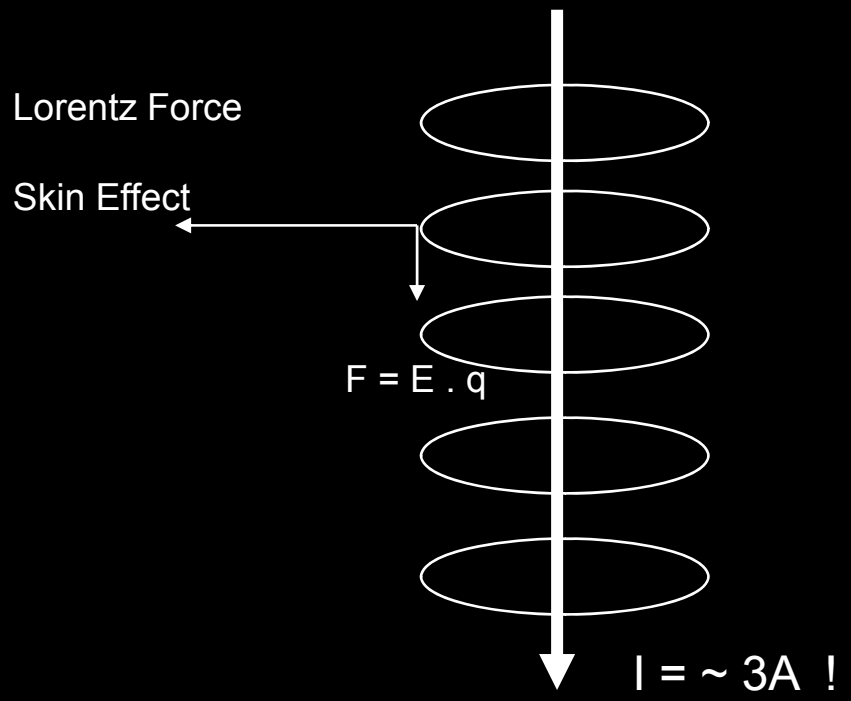


5 layers of Si_3N_4

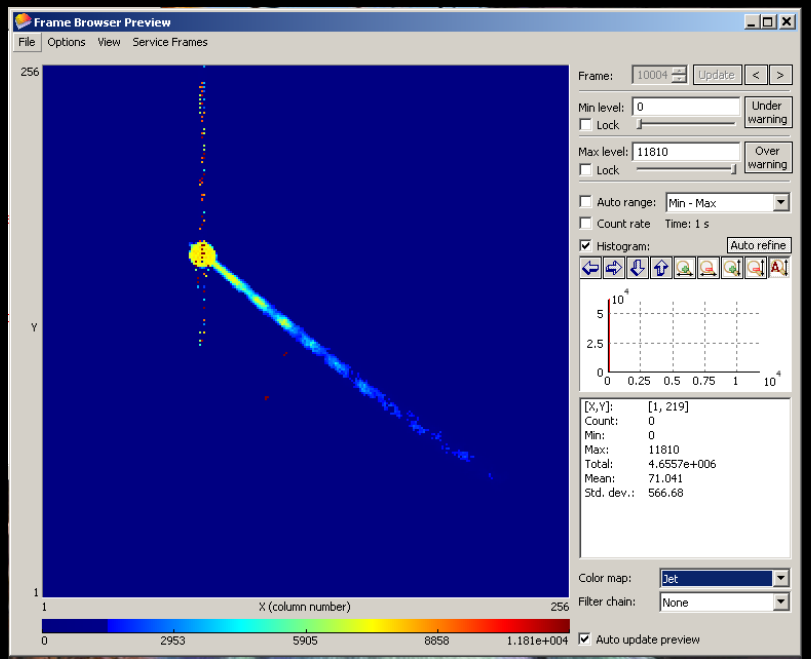


InGrid + a-Si:H

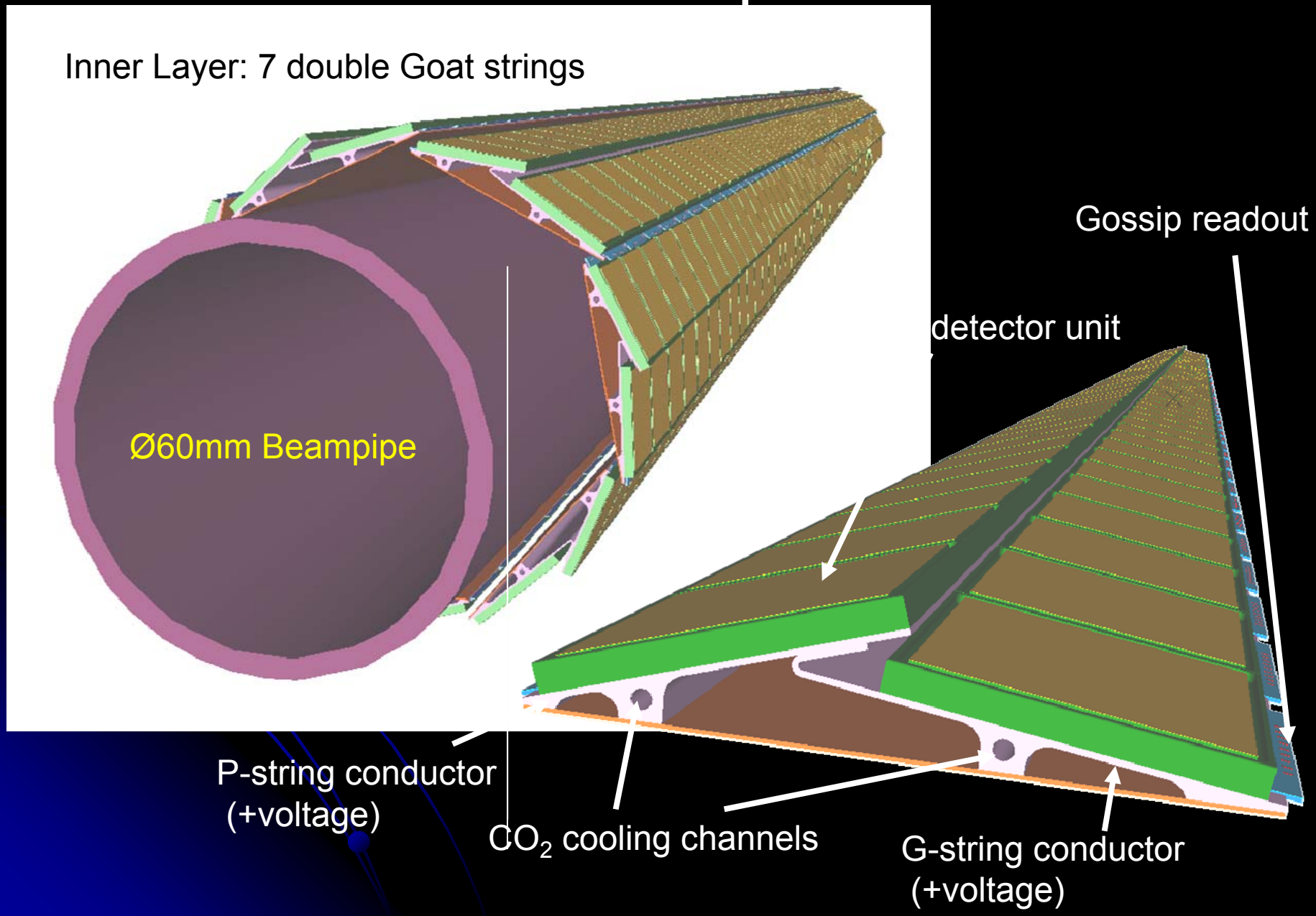


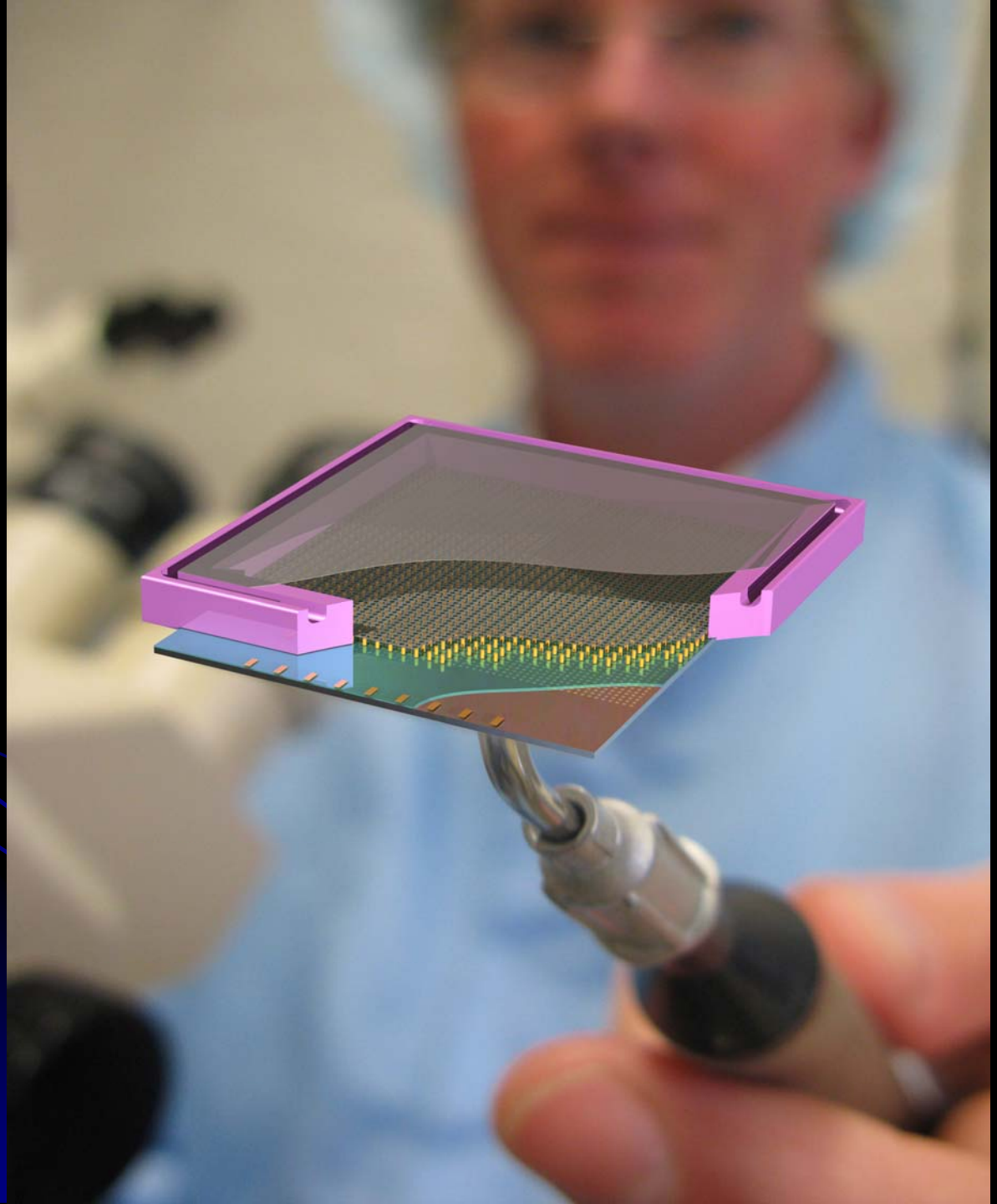


Improvement with Si Nitride



GOAT: GOssip in ATlas

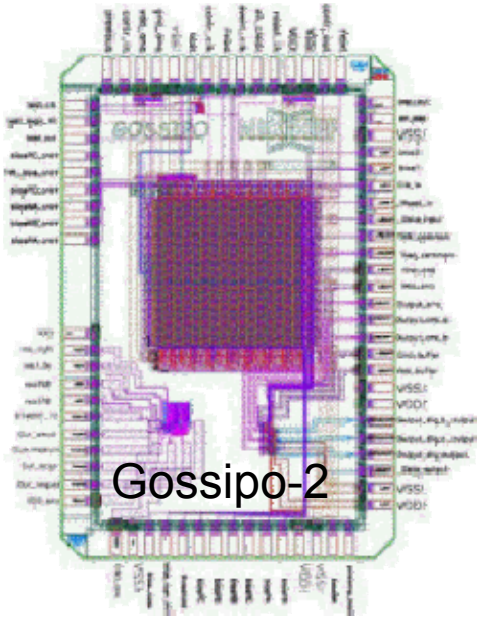




SiNProt, InGrid

- yield from MESA+ (Yevgen B) increased dramatically
- processing ‘chipsquares’ underway
- Tech transfer to IZM Berlin, SMC (Edinburg)
- First SiNProt substrates received from SMC
- LAAS, France, interested

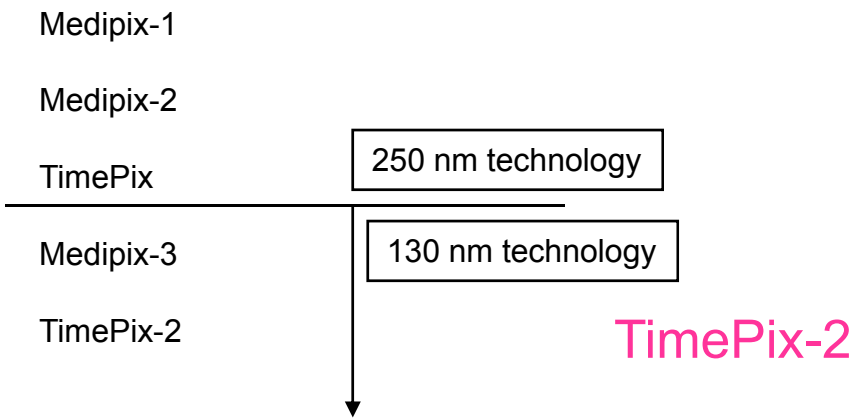
Chip Development



- FE-I4: new ATLAS Pixel chip
  functionality: time resolution (FP420), Upgrade

-TimePix-2
  - Medipix Consortium
  - CERN TT: commercial interest (Panalytical)

- Gossipo-3
  TDC per pixel: new DAQ structures
  Joint Nikhef/Bonn project



Two new (risky) projects:

- electron emission & multiplication detectors

- light & light digital communication system

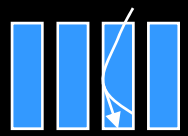
The future:

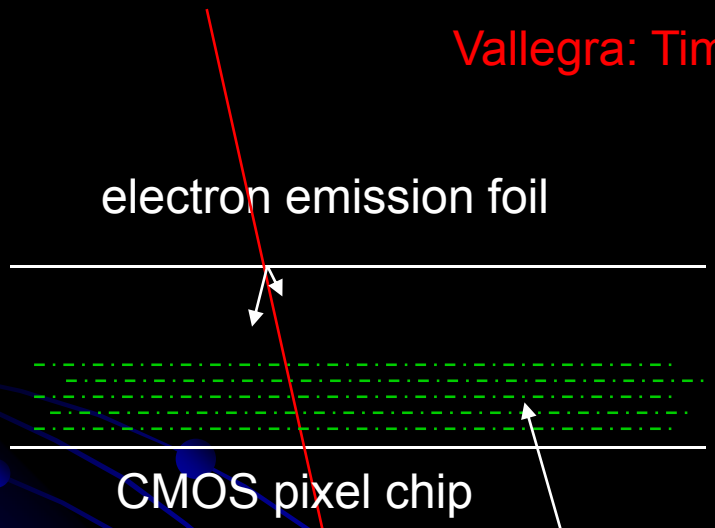
electron emission & avalanche detectors

Electron Emission Foil

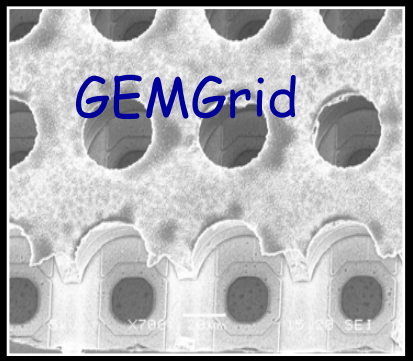
MEMS made MicroChannelPlates: 200 ps time resolution: CLIC

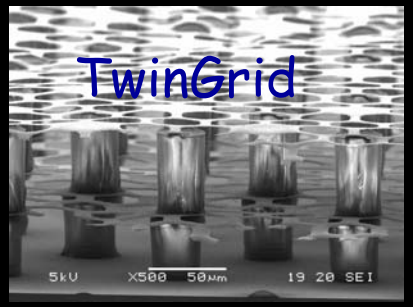
Vallegra: TimePix + MCPs

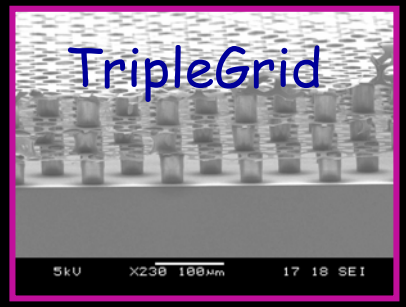




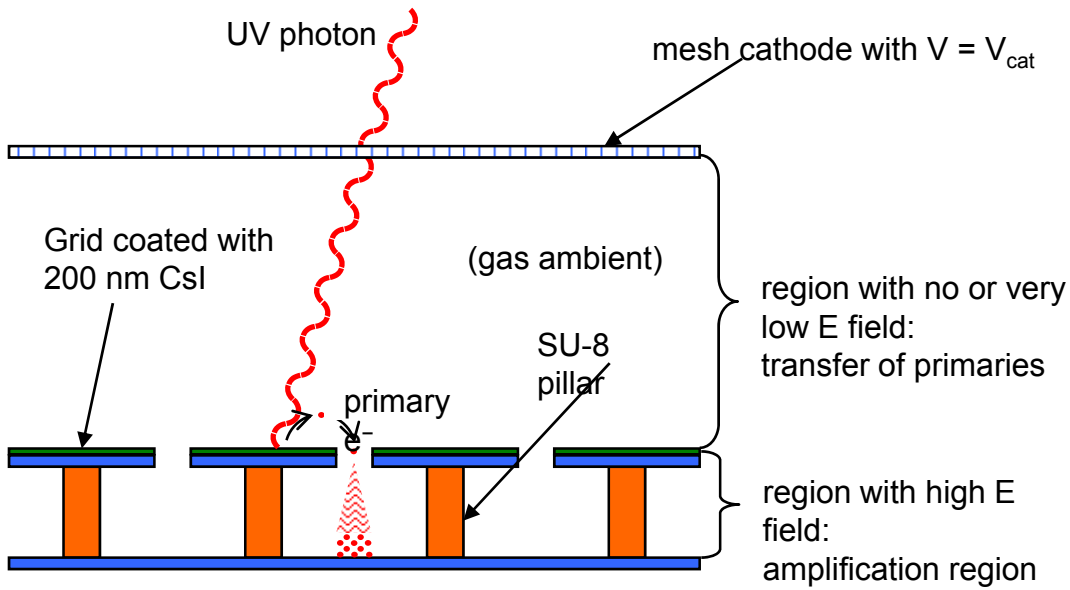
replace gas by vacuum
Micro Channel Plate (MCP)
ElectronMultiplyingGrid (EmGrid)
sub-ns time resolution
Note CLIC experiments, FP420







Now operational:

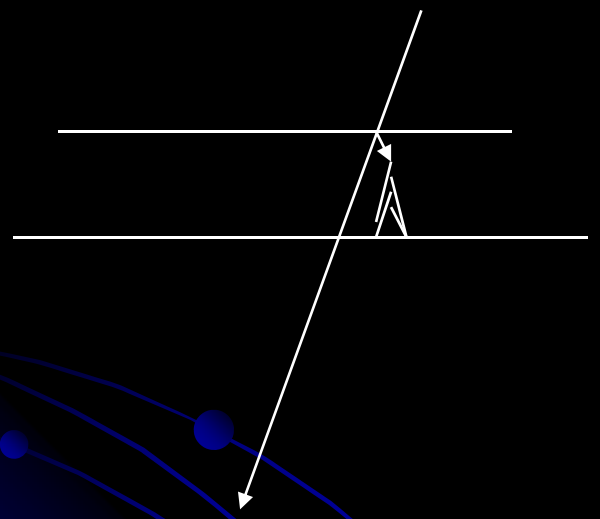


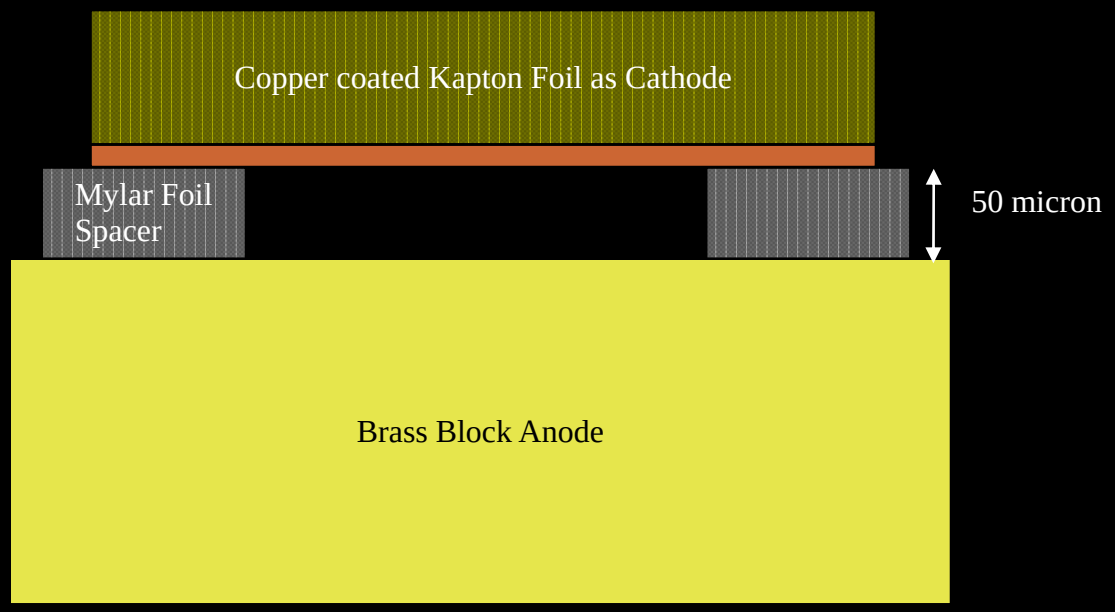
Joost Melay, Univ. Twente, MESA+
Jurriaan Schmitz' STW project 'There is plenty of room at the top'

With Amos Breskin, Weizmann Institute of Science in Rehovot, Israel ,

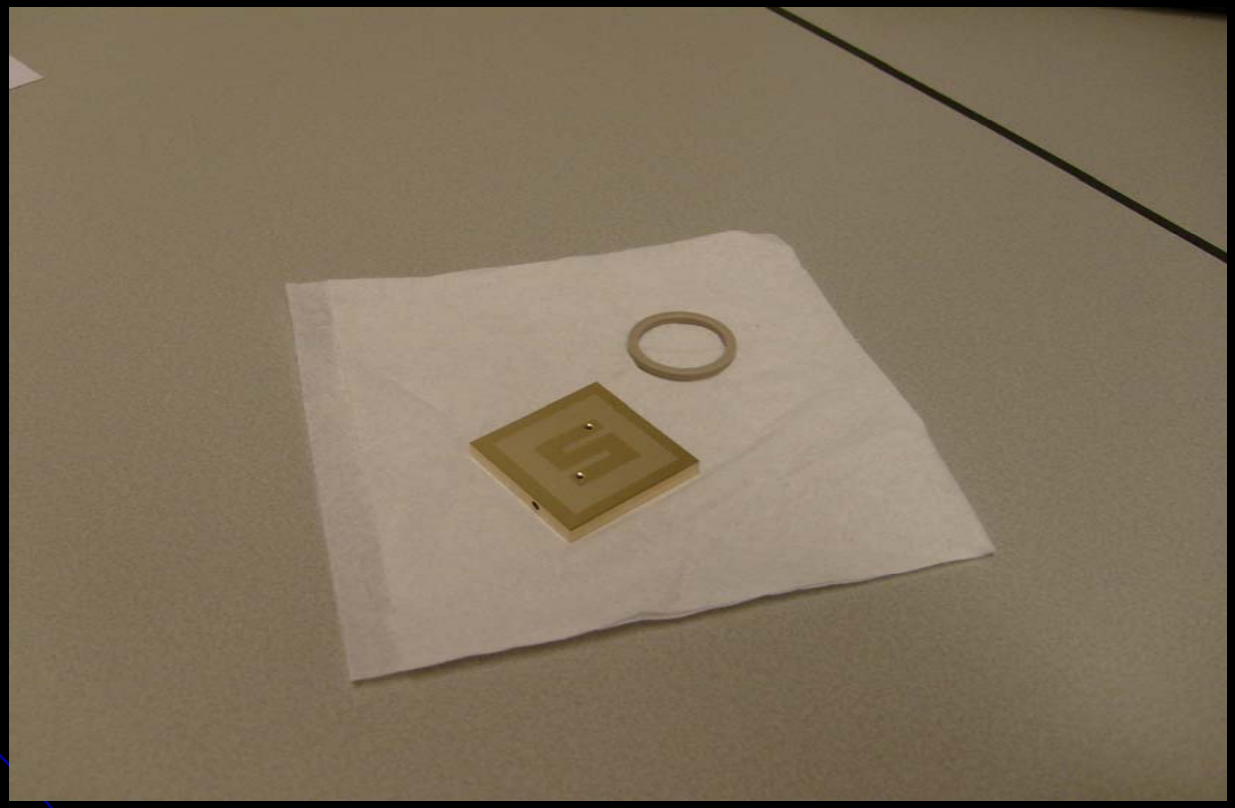
Parallel Plate Chamber

first EE foil tests with (gas filled) Parallel Plate Chamber

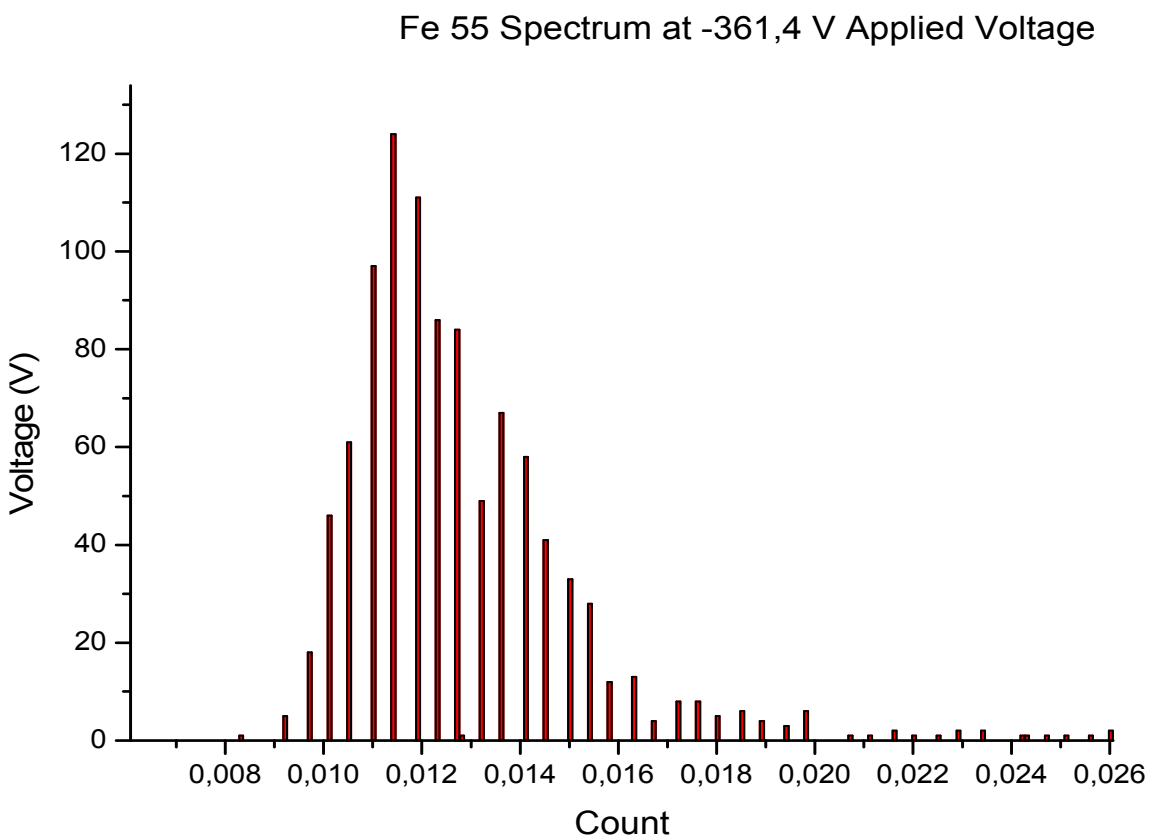




Parallel Plate Chamber

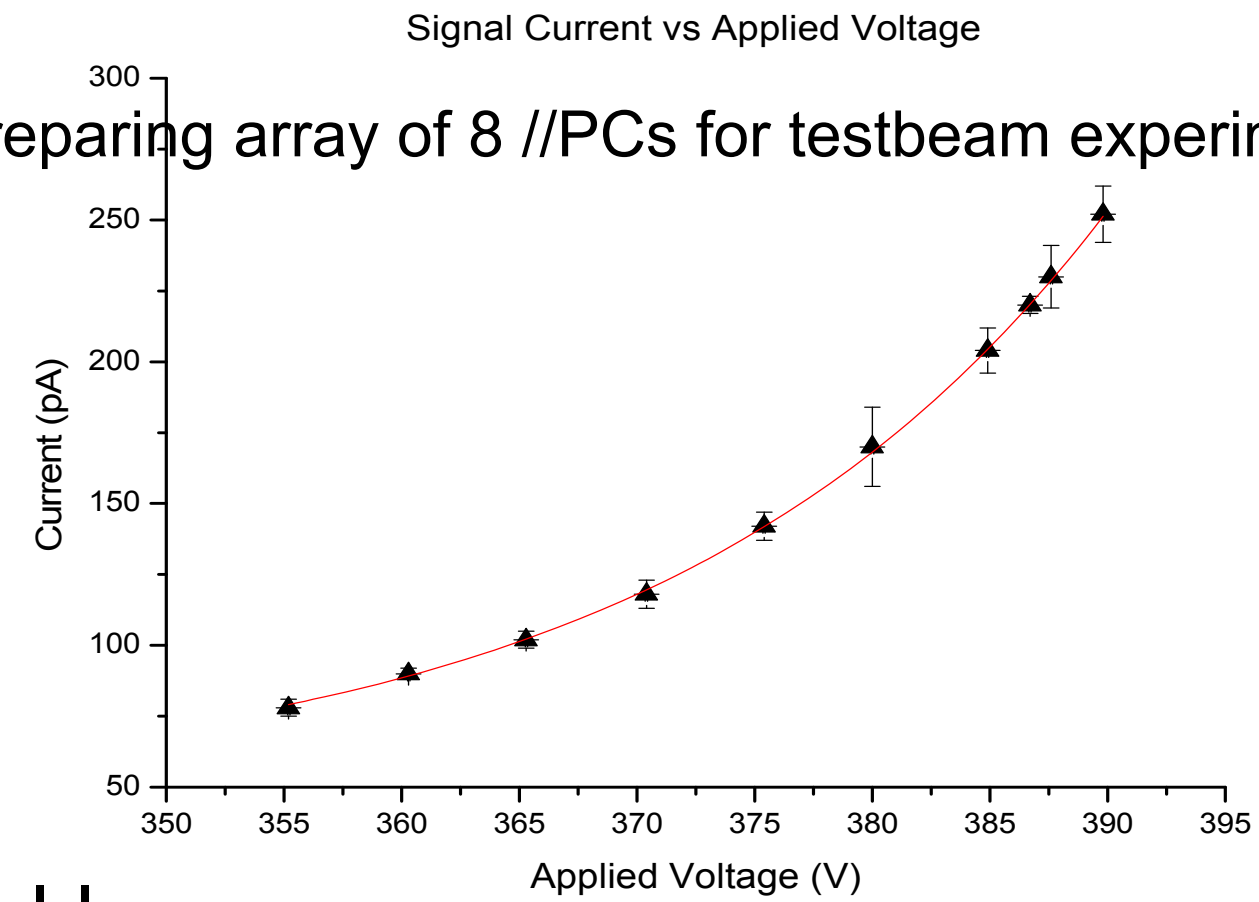


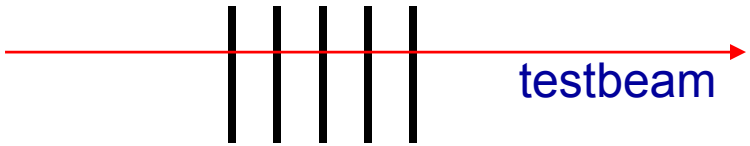
First Results



Preliminary Results

Preparing array of 8 //PCs for testbeam experiment





Wout Kremers, TU-Delft

Phase Modulator

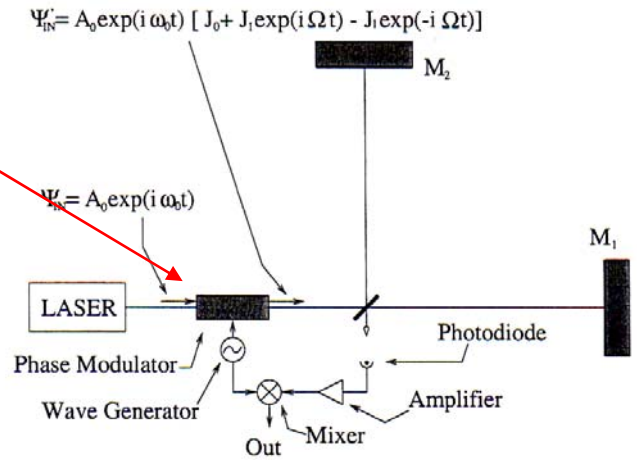


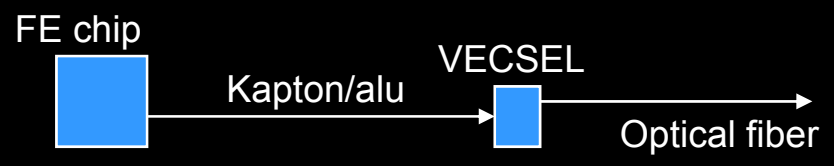
Figure 2.11: The Michelson interferometer in the frontal modulation scheme.

VIRGO

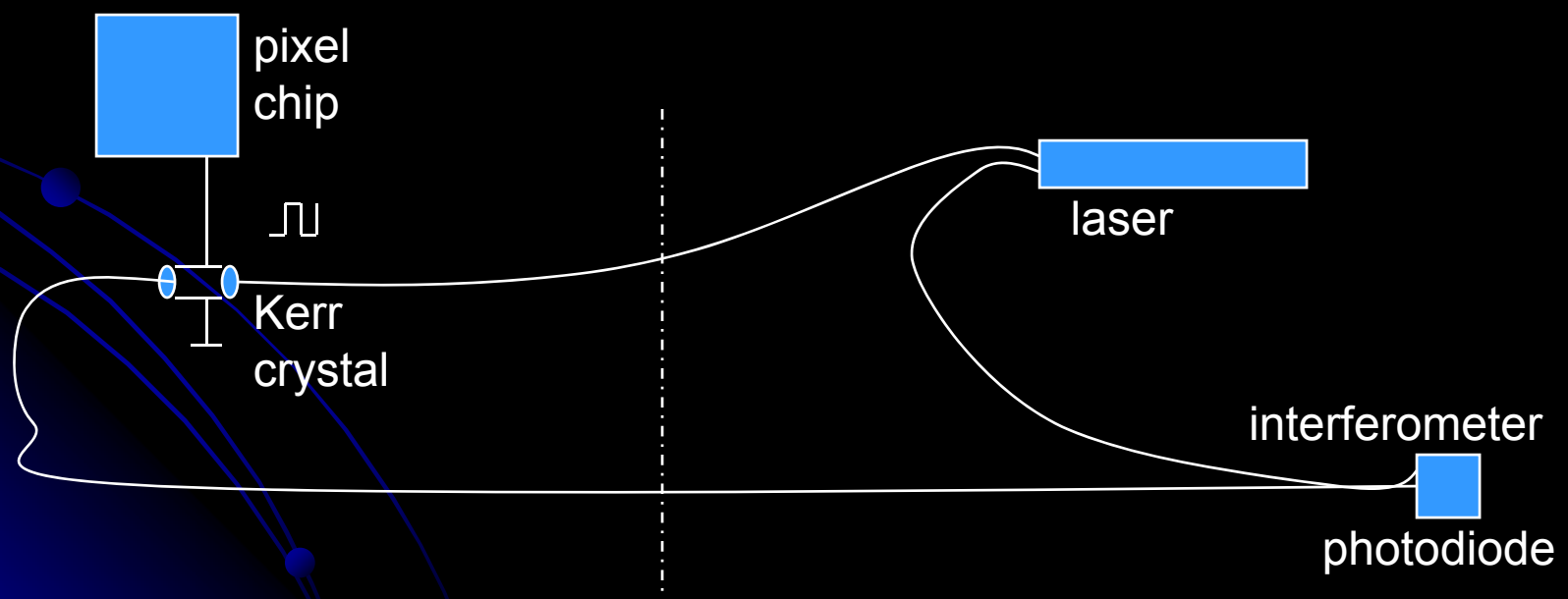
Data Transport

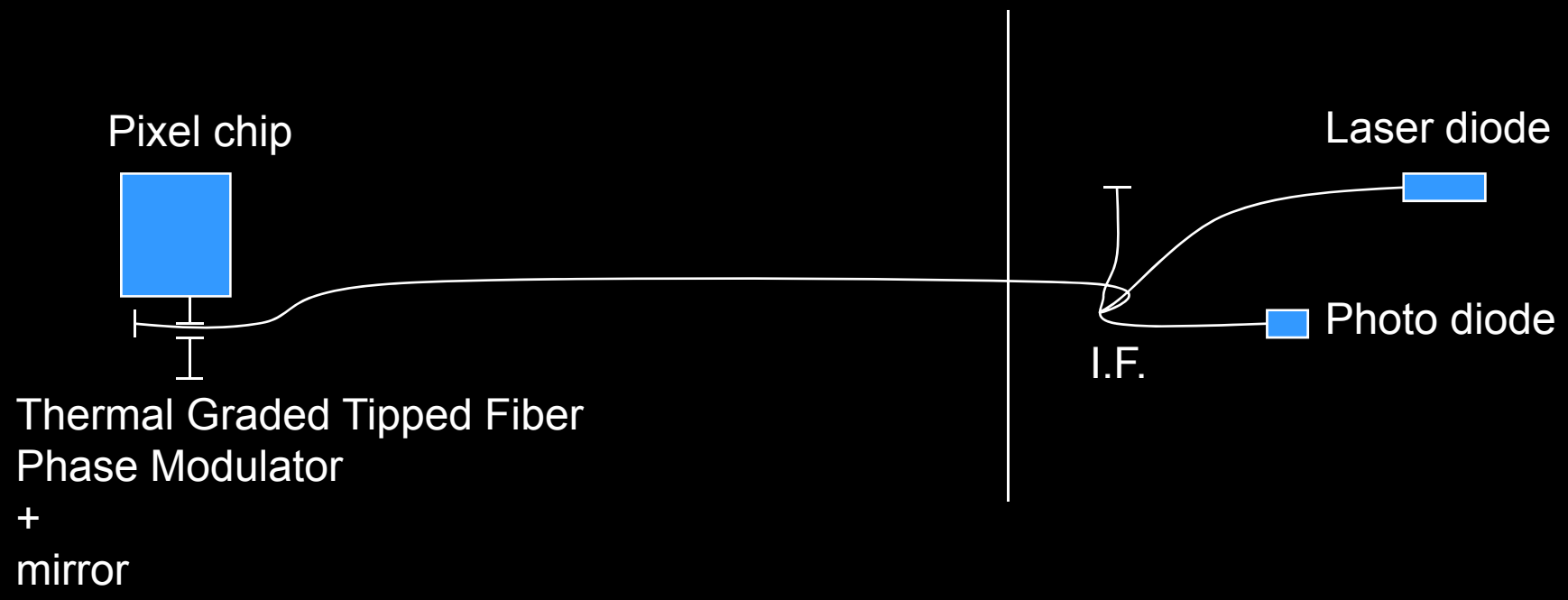
New bottleneck:
Data bus Kapton/Cu/Al

- data to outside world
- inter (pixel) chip communication
- Level 1 trigger



status: kapton/aluminium: dominant material for pixel detectors @ sLHC!
VECSELs + optical fiber: not rad hard, much material, much power required





- New rad-hard fiber with hole (tunnel) as core (only 5 m)
- new thermal-frozen gradedfiber phase modulator

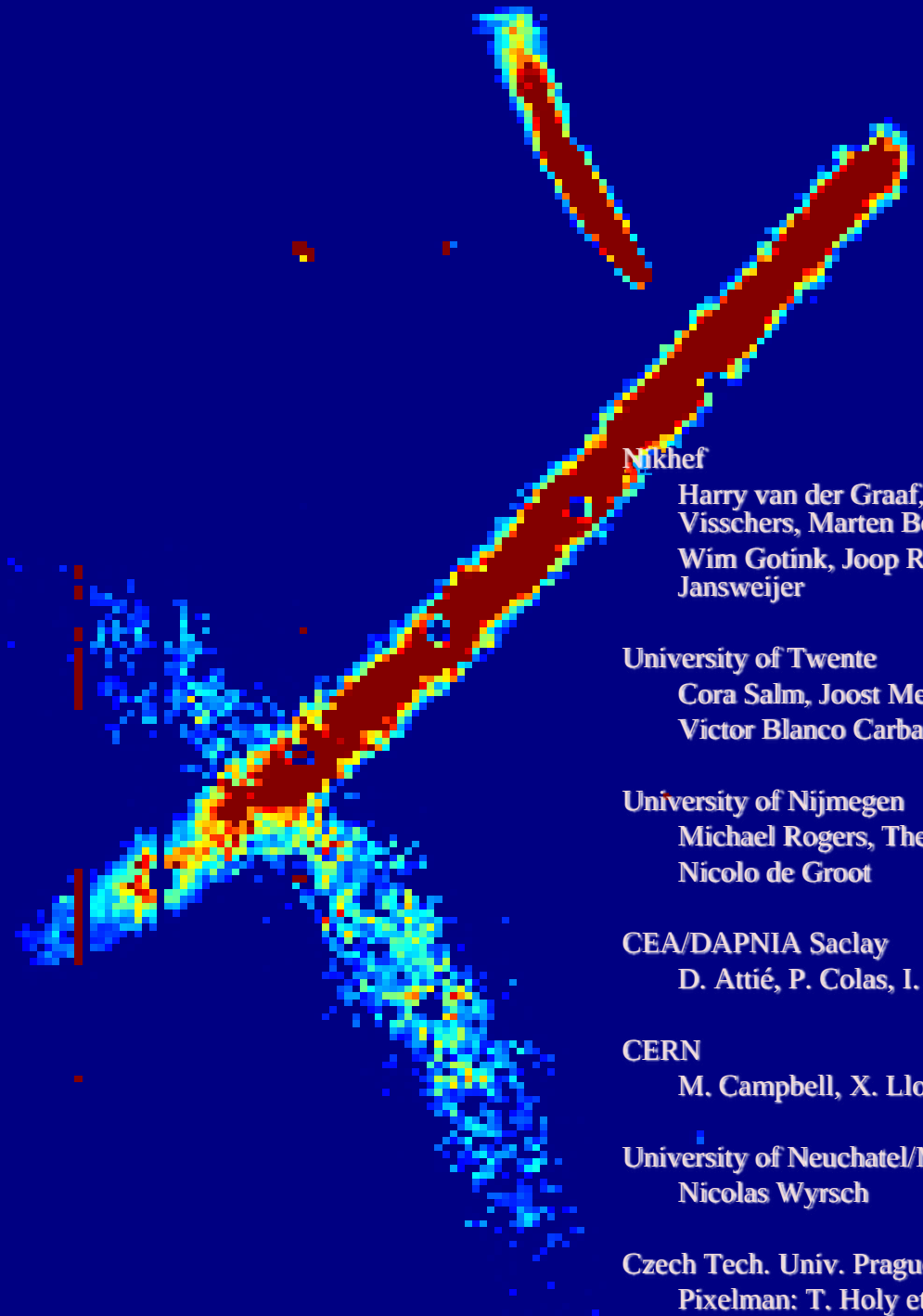
Present activity: KM3NET data-to-shore connection
Experts: Mar v.d. Hoek, Jelle Hogenbirk
New joint project?

μ-HV

High voltage power supply for MPGDs:

- low current) max 1 μA
- Would be nice if more current is physically impossible
- -500 V, -1000 V max
- digitally controlled (CAN bus for now)
- monitor current with 0.1 nA resolution: software trip
- works in B-field
- not (yet) radiation hard
- as small as possible: now box of 2 x 3 x 4 cm3, future 2 cm2
- powered by 50 V dc, 5 V dc

Available July 2009



Nikhef

Harry van der Graaf, Max Chefdeville, Fred Hartjes, Jan Timmermans, Jan Visschers, Marten Bosma, Martin Fransen, Yevgen Bilevych,
Wim Gotink, Joop Rovekamp, Lucie de Nooij, Wout Kremers, Peter Jansweijer

University of Twente

Cora Salm, Joost Melai, Jurriaan Schmitz, Sander Smits,
Victor Blanco Carballo

University of Nijmegen

Michael Rogers, Thei Wijnen, Adriaan Konig, Jan Dijkema,
Nicolo de Groot

CEA/DAPNIA Saclay

D. Attié, P. Colas, I. Giomataris

CERN

M. Campbell, X. Llopart

University of Neuchatel/MTI

Nicolas Wyrsch

Czech Tech. Univ. Prague, Praha

Pixelman: T. Holy et al.