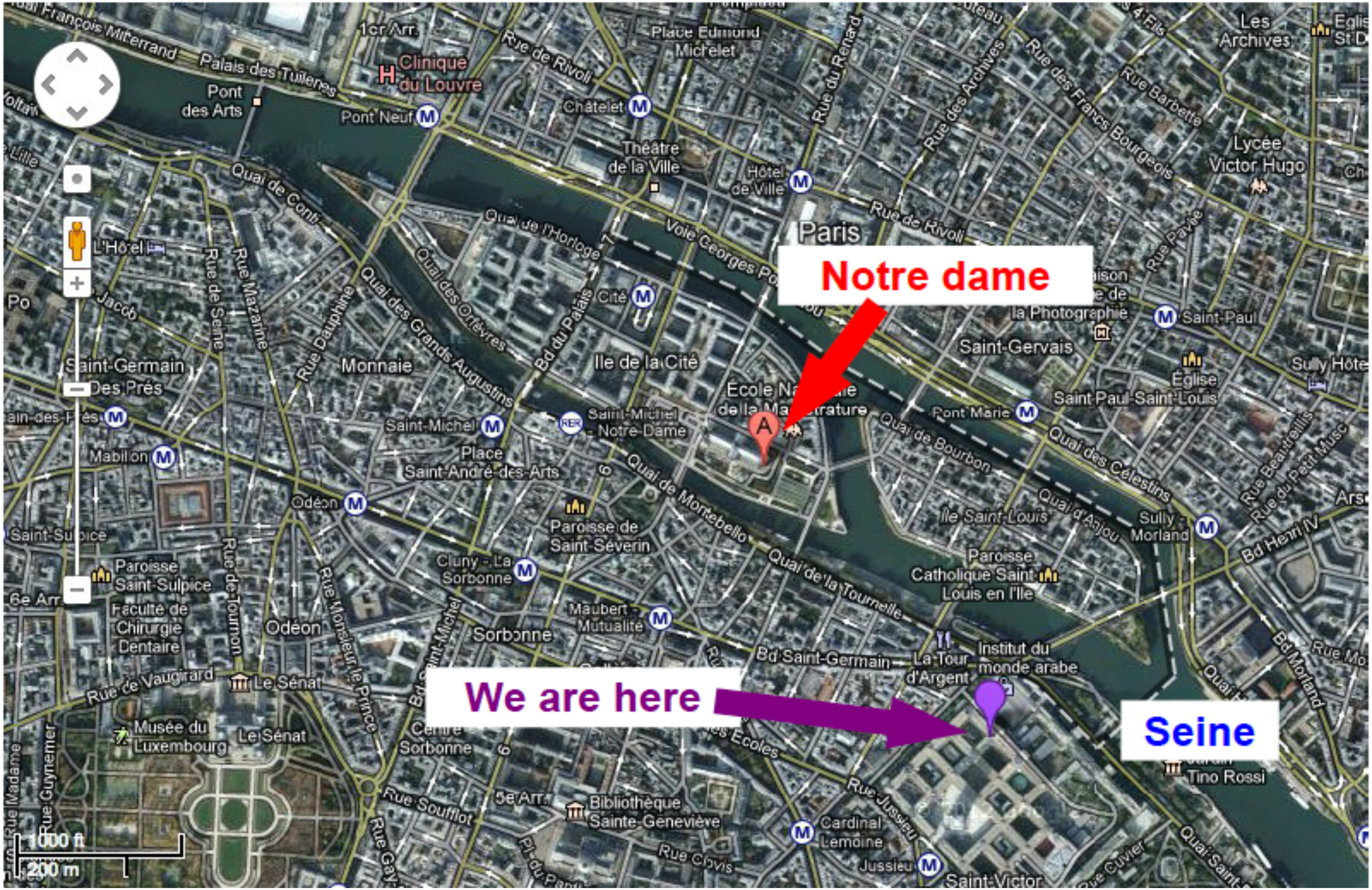
LPNHE (IN2P3 CNRS)

Laboratoire de Physique Nucléaire et de Hautes Energies

Mixed research unit (UMR) of Institut National de Physique Nucléaire et de Physique de Particules (IN2P3 CNRS) and Pierre et Marie Curie university (UPMC) and Paris Diderot university.

~ 100 researchers + 50 technical staff

Where we are


Notre dame
We are here
Seine
Paris
Ile de la Cité
Ile Saint-Louis
Quai de Conti
Quai des Grands Augustins
Quai de Montebello
Quai de la Tournelle
Quai de Bourbon
Quai d'Anjou
Quai des Célestins
Quai de l'Horloge
Quai des Orfèvres
Rue de Rivoli
Bd Saint-Germain
Saint-Germain Des Prés
Monnaie
Odéon
Sorbonne
Le Sénat
Musée du Luxembourg
Institut du monde arabe
La Tour d'Argent
Saint-Gervais
Pont Marie
Sully - Morland
Bibliothèque Sainte-Geneviève
Jussieu
Cardinal Lemoine
1000 ft
200 m

LPNHE ATLAS Group

- G. Calderini (Group Leader)
- T. Beau (Staff Res.)
- M. Bomben (Post-doc)
- J. Chauveau (Prof)
- O. Davignon (PhD)
- A. Demilly (PhD)
- S. De Cecco (Staff Res.)
- F. Derue (Staff Res.)
- M.W. Krasny (Staff Res.)
- M. Kuna (Post-doc)
- D. Lacour (Staff Res.)
- B. Laforge (Prof)
- S. Laplace (Staff Res.)
- G. Lefebvre (PhD)
- B. Malaescu (Staff Res.)
- G. Marchiori (Staff Res.)
- N. Méric-Chrétien (PhD)
- I. Nikolic-Audit (Staff Res.)
- J. Ocariz (Prof)
- S. Pirès (Stage)
- C. Rangel-Smith (PhD)
- M. Ridel (Staff Res.)
- L. Roos (Staff Res.)
- Ph. Schwemling (Prof)
- T. Théveneaux-Pelzer (PhD)
- H. Torres (PhD)
- S. Trincaz-Duvoid (Staff Res)
- F. Vannucci (Prof)
- L. Yao (PhD)
- F. Crescioli
- D. Laporte
- Y. Orain,
- J.F. Genat,
- O. Ledortz
- L. Martin,
- V. Mendoza

People with implications in Si sensors and FTK

Giovanni Calderini – Director of research — in IAPP
- Former BaBar tracker project leader
- Planar pixels for ATLAS upgrade

Giovanni Marchiori – Researcher
- Experience in Silicon detectors

Marco Bomben – Post-doc
- Experience in Silicon detectors
- ATLAS pixel test beam coordinator

Jacques Chauveau – Professor UPMC
- Experience in Silicon detectors

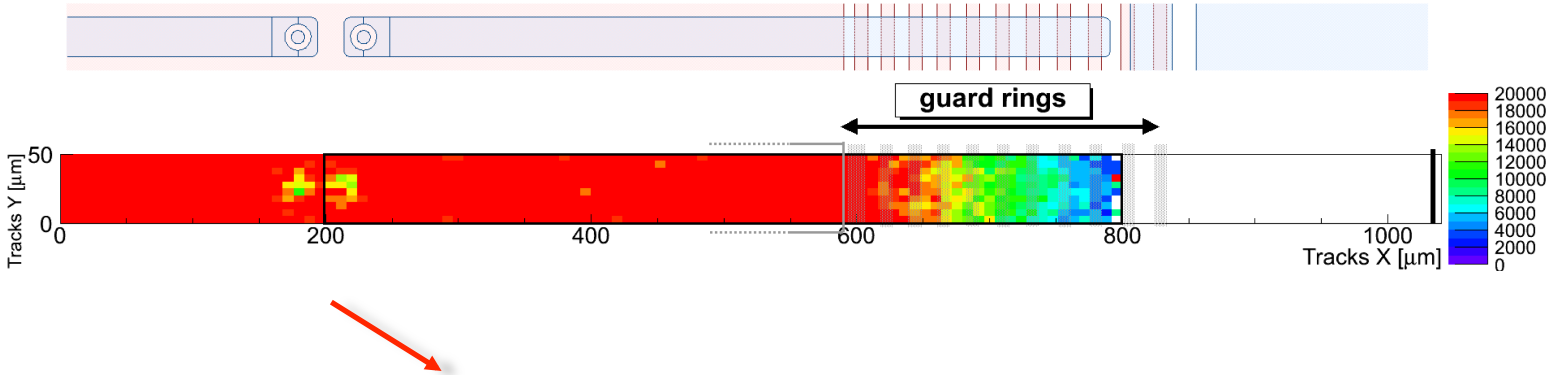
Francesco Crescioli – Research Engineer — in IAPP
- FTK experience

Jean-Francois Genat – Research Engineer
- Experience in chip design

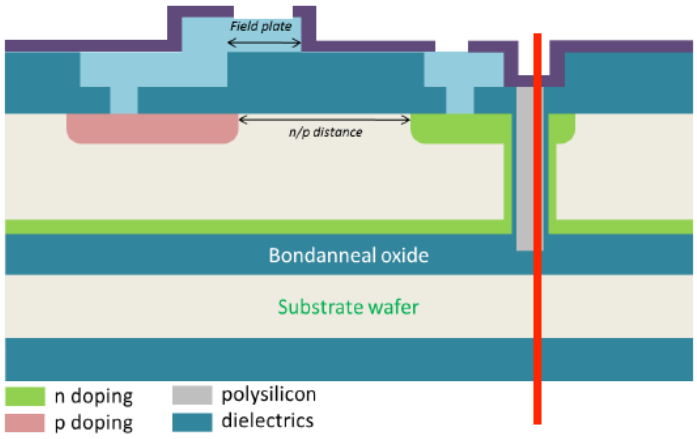
Olivier Le Dortz – Research Engineer
- FPGA and perif. electronics experience

Sensors

- Contribution to ATLAS IBL
  - Simulations (Silvaco)
  - pixel-over-guard rings design
  - several n-in-n and n-in-p productions



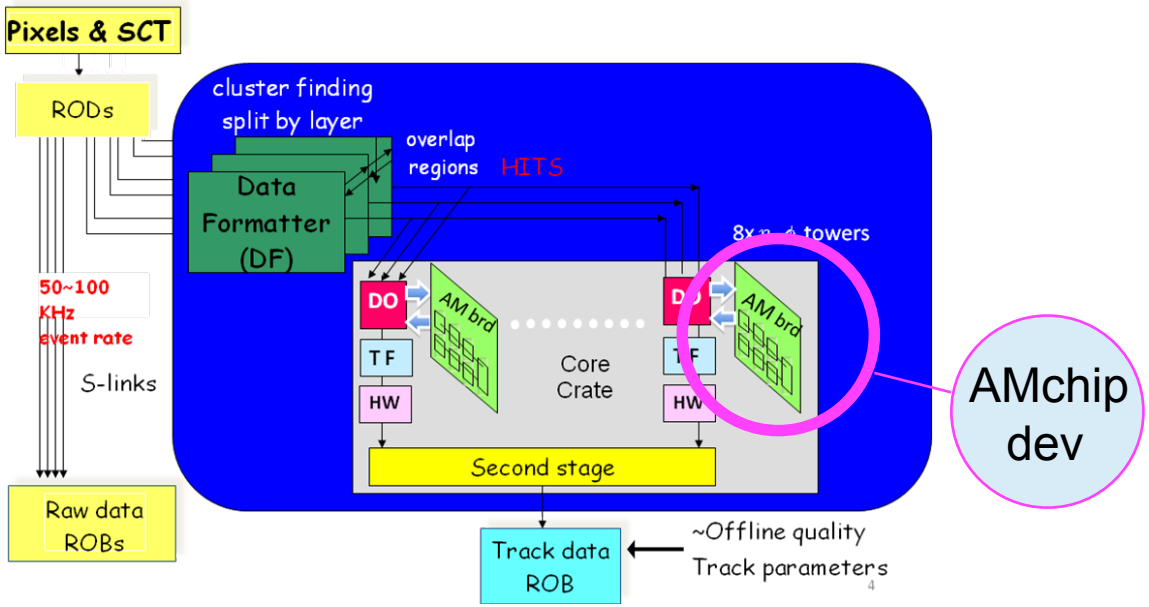
- Edgeless planar sensors (FBK-LPNHE)
  - Aim to phase-II ID (mid-outer layers)
  - Reduced dead area at periphery (~100 µm)
  - Sensors designed & simulated via TCAD
  - Tests started in our clean room
  - Next: CCE at periphery w/ laser, sources, beams

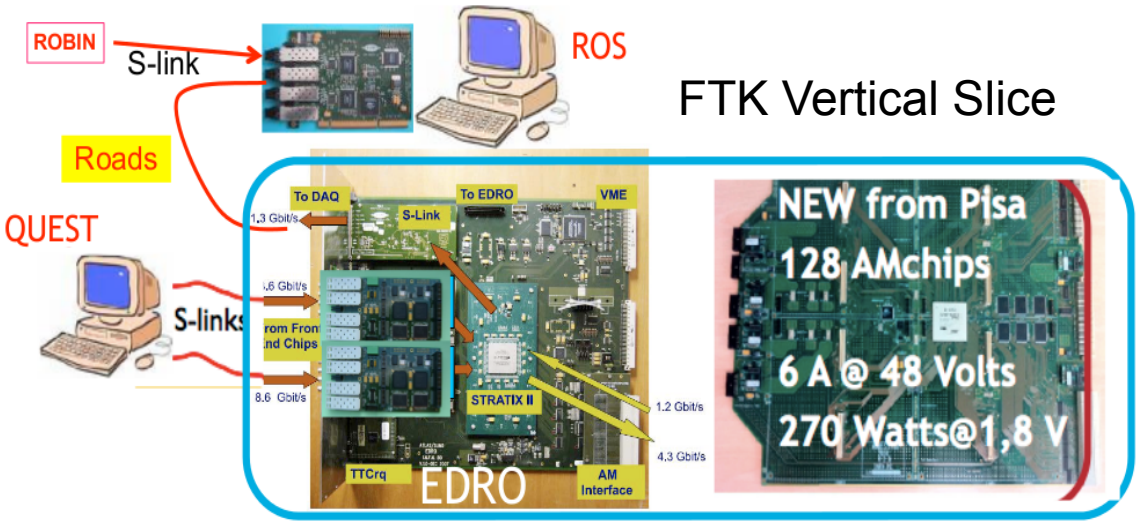


Cut line

FTK experience

Hardware





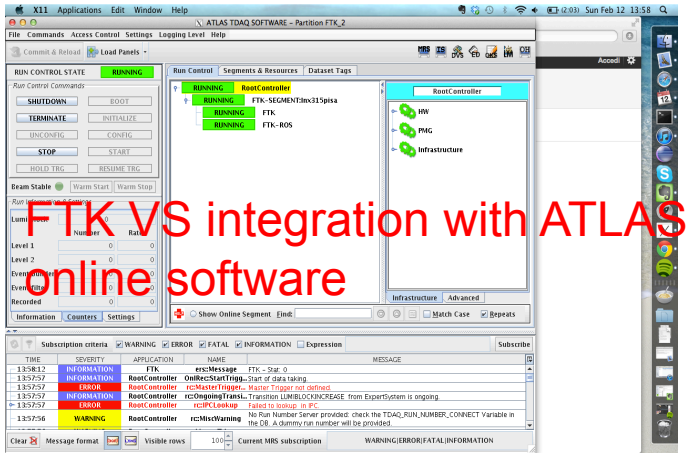
FTK Vertical Slice

Software

FTK simulation &
data preparation software

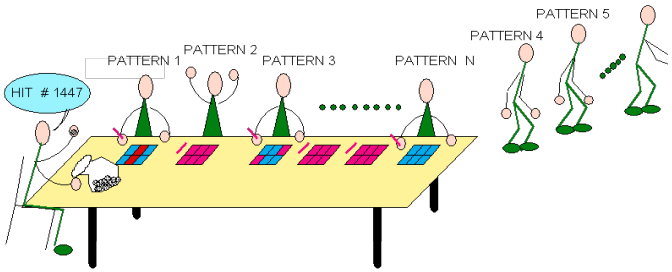
FTKSim
- Pattern generator
from data & constants

FTKSim in ATHENA
- JobOptions for trigger
studies



FTK VS integration with ATLAS online software

Associative Memory ~ AMchip



The associative memory is the core component of the pattern recognition stage of FTK

Performs the higly demanding task of coarse tracks finding in the full event.

The associative memory hardware is based on a custom made ASIC: AMchip

AMchip-based associative memory device first used in CDF (Amchip03).

AMchip03

- 6-layers patterns @ 18-bit
- ~5kpatt/chip
- 40 MHz

Used by FTK VS

FTK needs more advanced technology:

AMchip04

- 8-layers @ 15-bit (configurable3-7 bit w/ ternary logic)
- ~8kpatt/chip
- 100 MHz

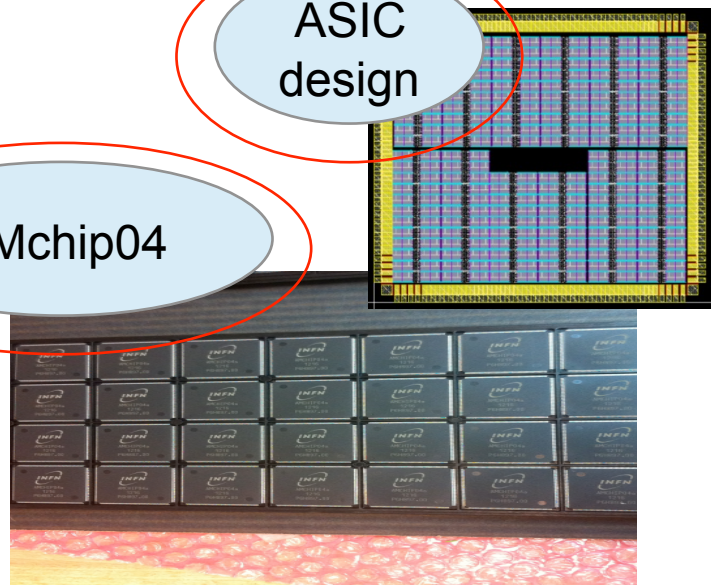
AMchip05

- High speed serial I/O
- ~32kpatt/chip
- Stream merge function

Design phase

ASIC design

AMchip04



LPNHE activities in FTK/IAPP

- **Development of a low-noise alimentation framework for radiation damaged ATLAS sensors**
  (collaboration with CAEN)

- **Test-stand development for FTK board validation and commissioning**
  - AMchip tests
  - Boards tests
  - Integration HW/SW