

Activités Actuels

FACULTÉ DES SCIENCES

Les hautes energies

ATLAS

CDF

EUDET - R&D vers ILC

SLHC

Neutrinos

HARP

T2K

NA61

MICE

17 A
16 MA
4 Coll Sci

2
groupes
techniques
(fort)

Astroparticules

AMS

POLAR

CTA

Ondes gravitationnelles

Mesures de précision

FAST

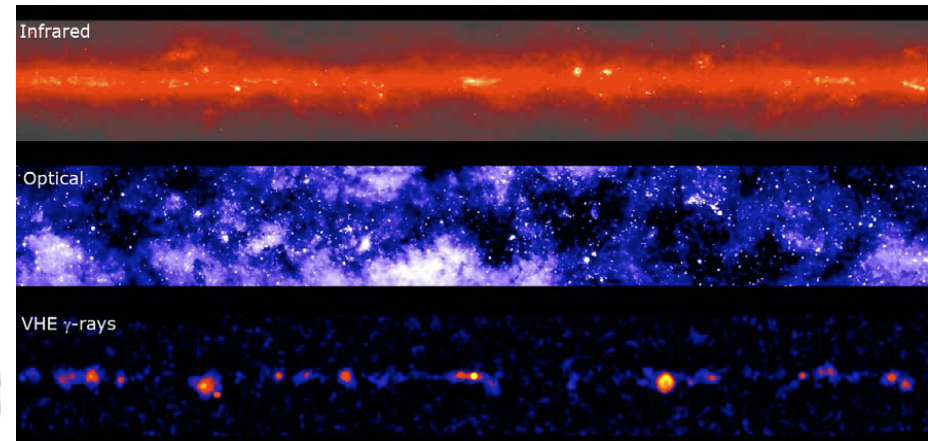
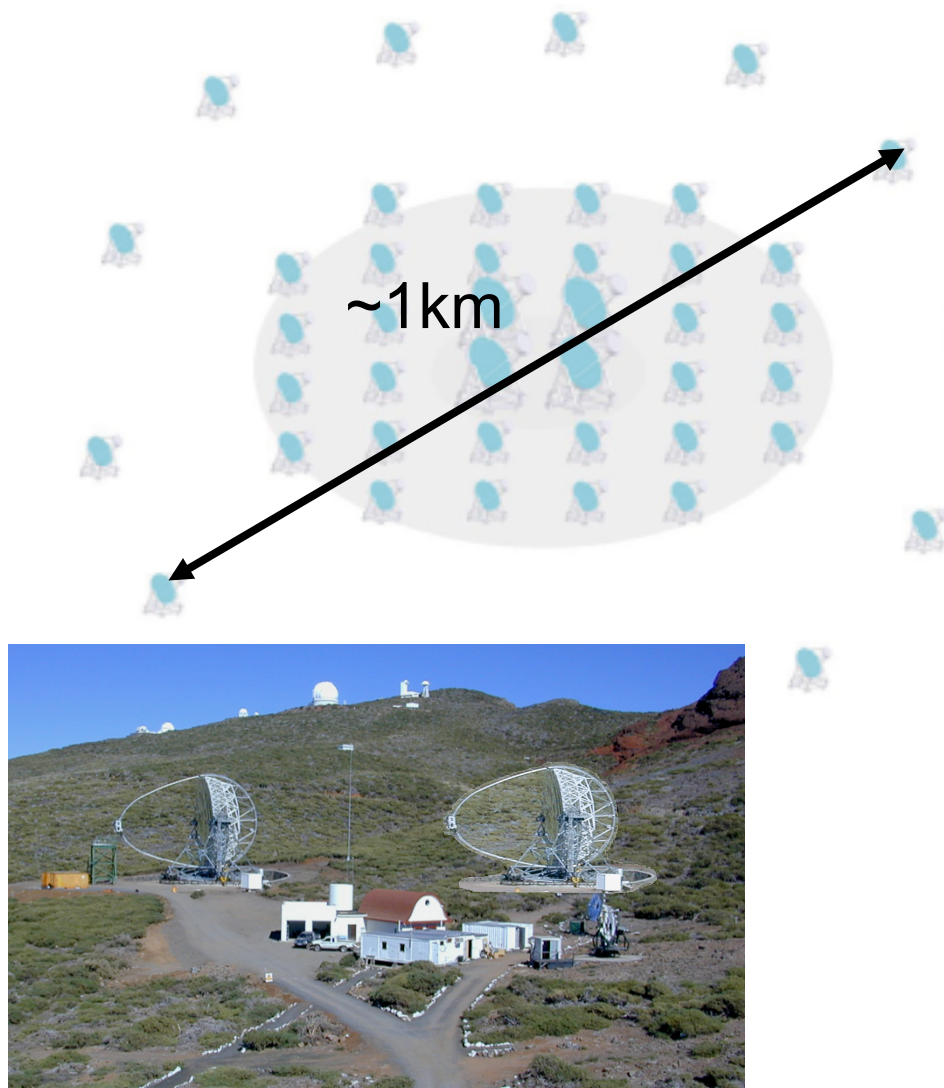
Une vision du futur
- la physique
- les défis techniques



1. Etude: POLAR
Mesure de la polarisation des sursauts des photons
2. Etude CTA:
La prochaine génération des observations astronomique en utilisant les photons
 $\sim 50 \text{ GeV} < E < 10 \text{ TeV}$
3. Construction: Astro-H

What is CTA and why participate

FACULTÉ DES SCIENCES



- Large array of **Cherenkov telescopes** à la HESS/Magic
- Central project for **multi-wavelength** and **multi-messenger** exploration
- Highly ranked by **ApPEC, ASPERA, ASTRONET, ESFRI**
- European observatory comparable to ALMA, VLT, etc.
- 30 institutes from **particle physics** and **astrophysics**

Swiss participation in CTA

FACULTÉ DES SCIENCES

ETH

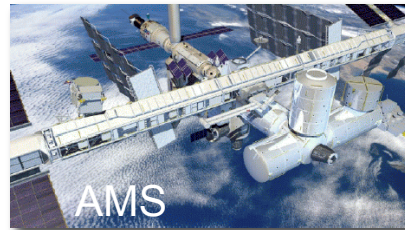
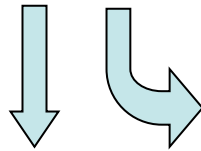
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

DPNC

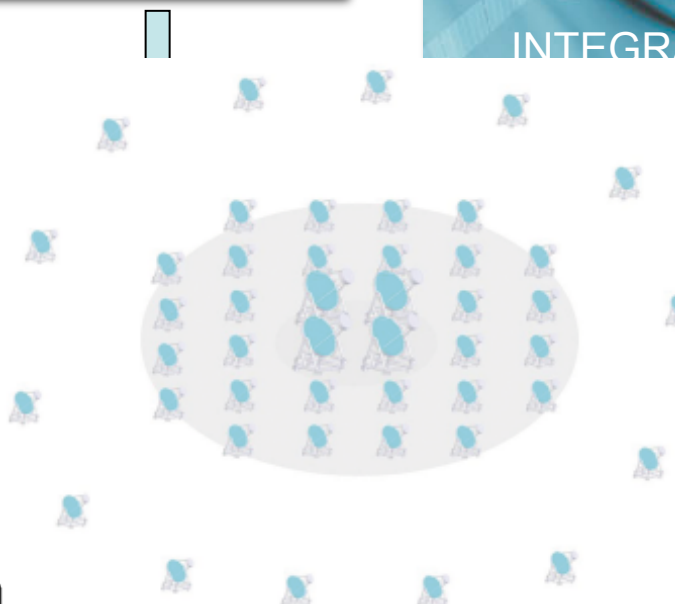


INTEGRAL
SCIENCE DATA CENTRE

PSI



Universität Zürich



UNIVERSITÉ
DE GENÈVE

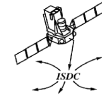
DPNC - 091208

Swiss proposal: gAPD Cherenkov Camera

FACULTÉ DES SCIENCES

ETH

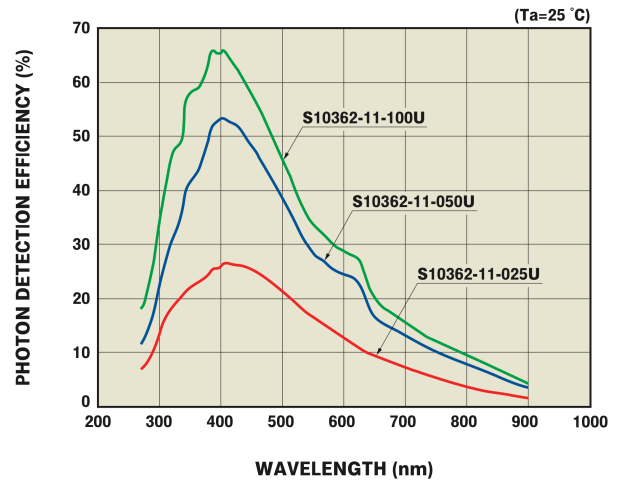
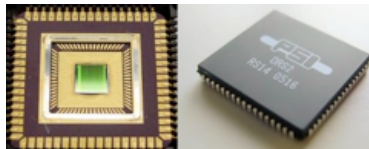
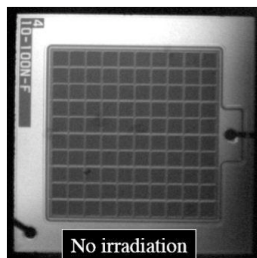
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich



INTEGRAL
SCIENCE DATA CENTRE



Universität Zürich



- Cherenkov camera prototype, 1k pixels
- Based on Geiger mode Avalanche Photodiodes
- Double sensitivity to photons $\Leftrightarrow$ double telescope size
- Integrate into existing HEGRA mount in La Palma
- Long term observations of variable source
- Real life test and qualification for advanced CTA technology
- Industrialization to be prepared
- Swiss heritage:
 - Light detection technology
 - APD technology
 - Domino front-end chip

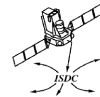


Swiss proposal: CTA Science Data Centre

FACULTÉ DES SCIENCES



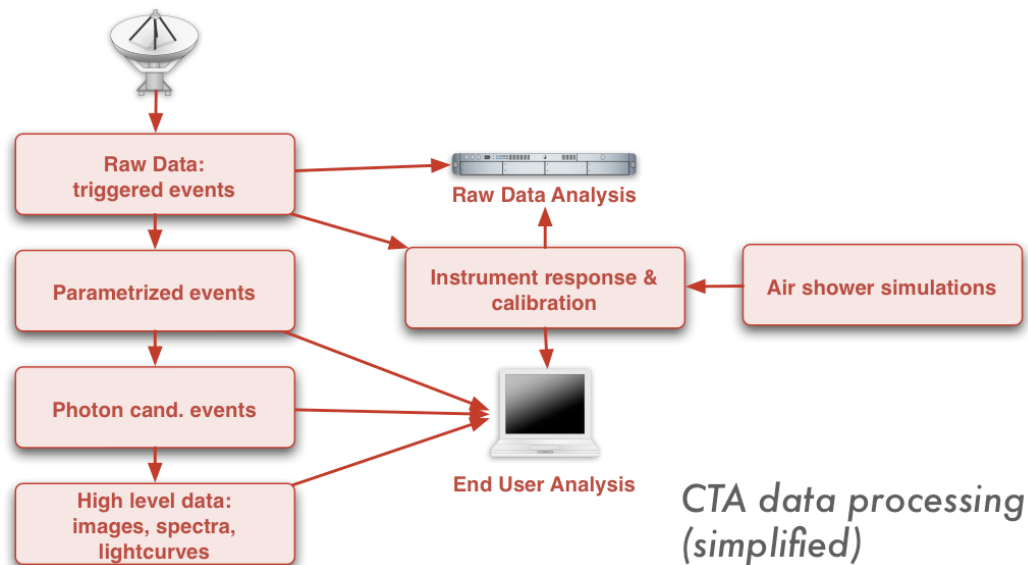
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich



INTEGRAL
SCIENCE DATA CENTRE



Universität Zürich



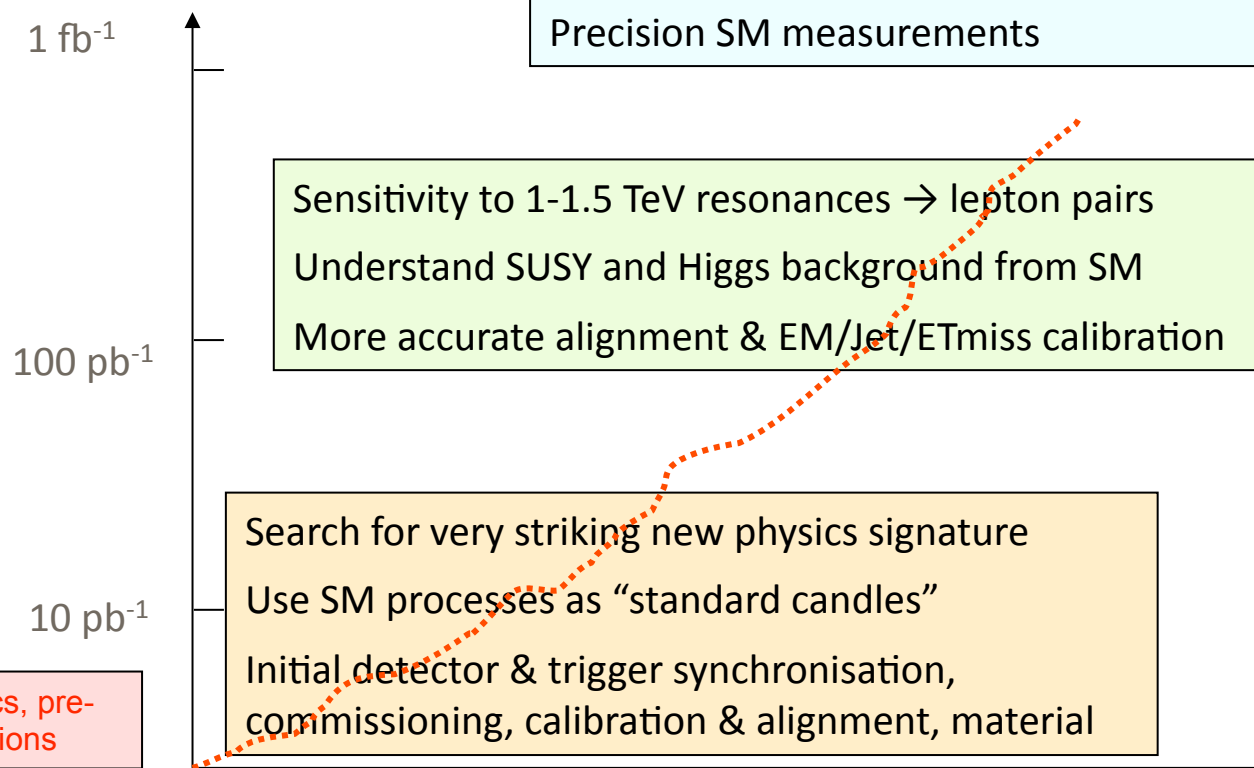
CTA science data center is a strategic investment: CH funds attract scientific excellence, manpower and funds to Switzerland, enables collaboration

- Observatory-type organization
- Resident and guest observers
- Time allocation by peer review
- 1000 sources/y observed
- Raw data archive 3Pb/y
- Calibration and processing
- Science archive, public access
- Offline analysis and user support
- Include archive from other Cherenkov arrays: HEGRA, H.E.S.S., MAGIC etc.
- Swiss heritage:
 - ISDC
 - CERN and Manno data centers for LHC



1 pb⁻¹ ≡ 3 jours à L=10³¹cm⁻²s⁻¹
et efficacité 30%

Higgs discovery sensitivity ($M_H=130\sim 500$ GeV)
Explore SUSY to $m \sim \text{TeV}$
Precision SM measurements

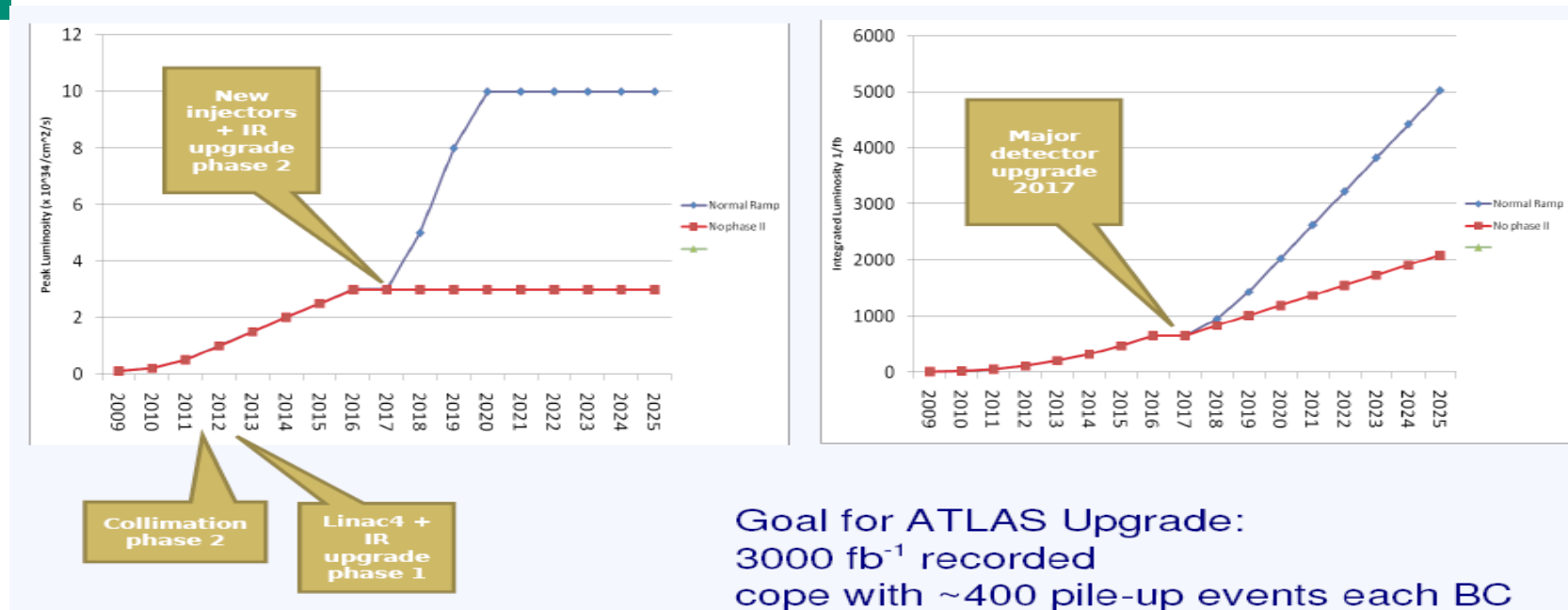


14 TeV
2010

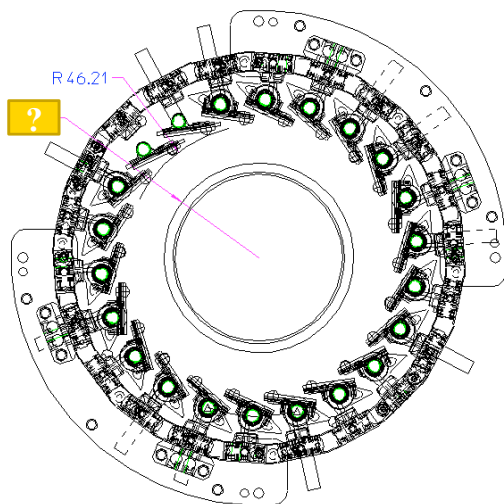
10 TeV
2009

Test beam, cosmics, pre-
alignment, calibrations

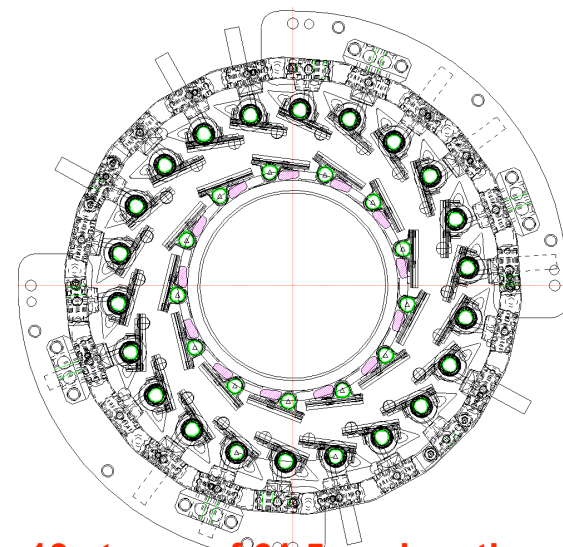
L'emphasis d'ATLAS sera l'analyse des données pour vérifier le MS
avec l'identification du Higgs
Mais déjà SLHC – haute luminosité – est planifié



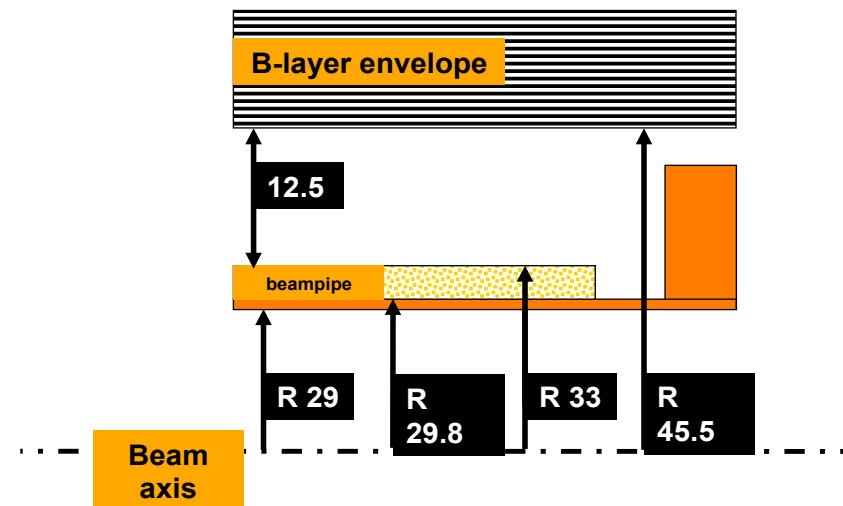
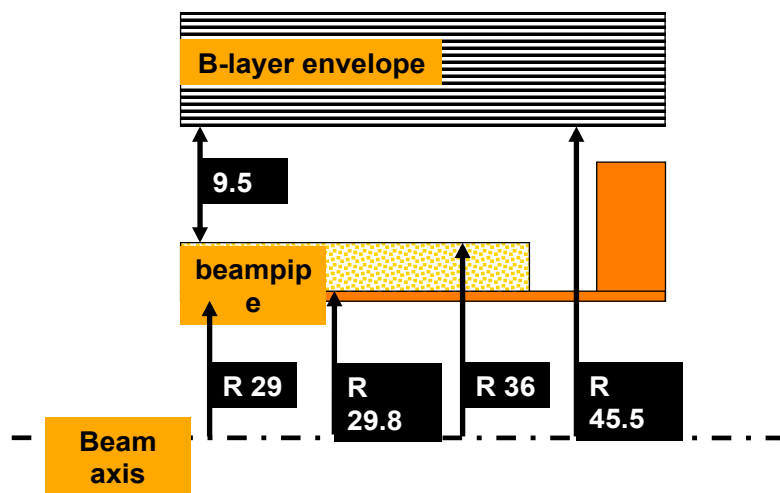
- Base de planification (*avant l'accident du LHC*)
- Phase 1 – 6-8 mois arrêt fin 2012
 - Luminosité initial $3 \times 10^{-34} \text{ cm}^{-2} \text{ s}^{-1}$ à la fin de la phase 1
 - Insertion d'un nouveau couche pixel "B-layer"
- Phase 2 – arrêt de 18 mois à la fin de 2016
 - Luminosité $10 \times 10^{-34} \text{ cm}^{-2} \text{ s}^{-1}$
 - L'environnement très hostile nécessite des grandes améliorations des détecteurs ATLAS et CMS – R&D déjà très avancé
 - Nouveau «all-silicon Inner Tracking Detector»
 - Une grande amélioration du spectromètre muon
 - L'électronique des calorimètres
 - Acquisition des données et déclenchement des événements



2009-2013



13 staves of 61.5 cm length
PLANNED (indicative only)



Le DPNC sera impliqué dans ce projet

DPNC déjà très impliqué:

G. Barbier
F. Cadoux
A. Clark
D. Ferrere
S. Gonzales
D. La Marra
S. Pernecker
E. Perrin
K-P. Streit
M. Weber

2009: LOI

2010: TP

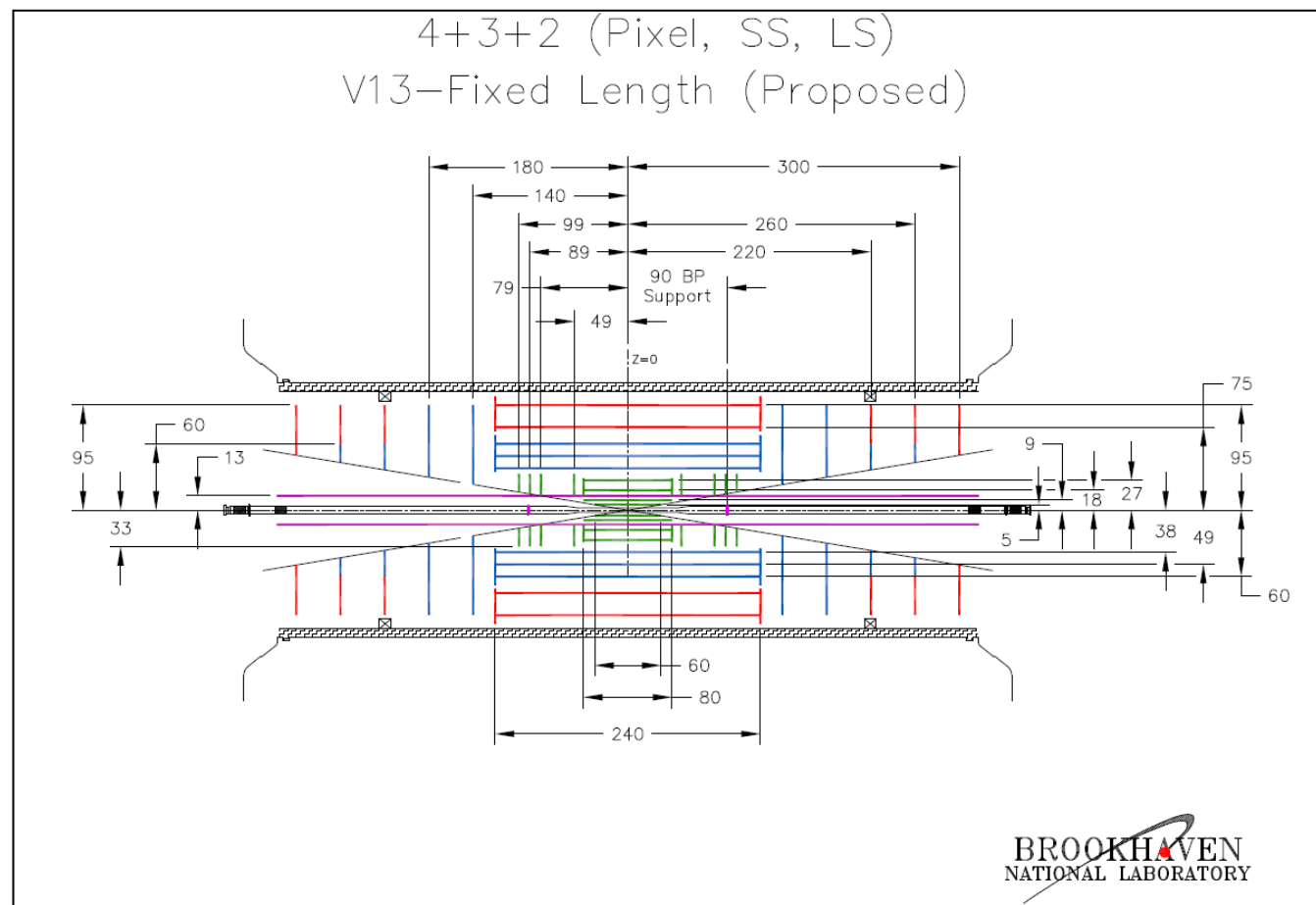
2011: TDR

2012: construction

Barrel Pixel Tracker Layers:

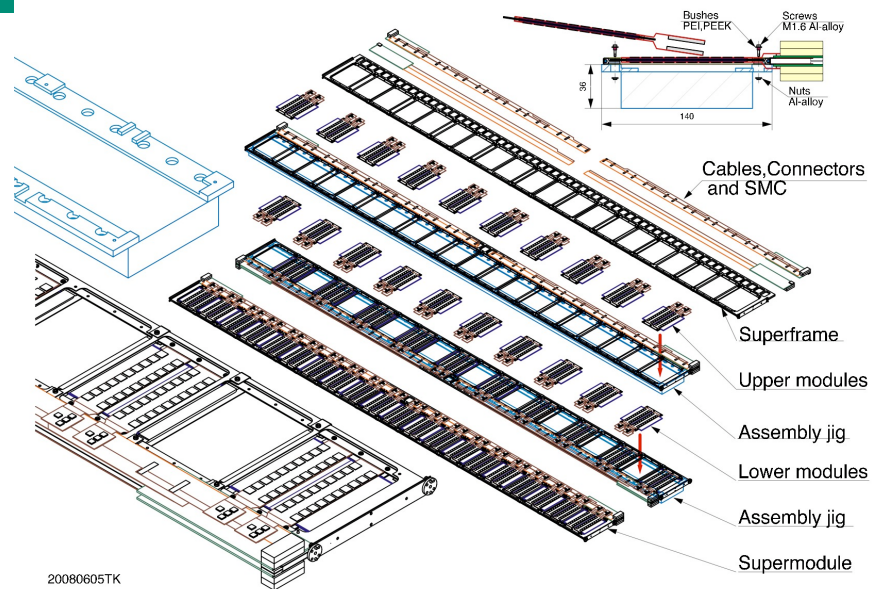
Short Strip (2.4 cm) μ -strips (stereo layers):

Long Strip (9.6 cm) μ -strips (stereo layers):

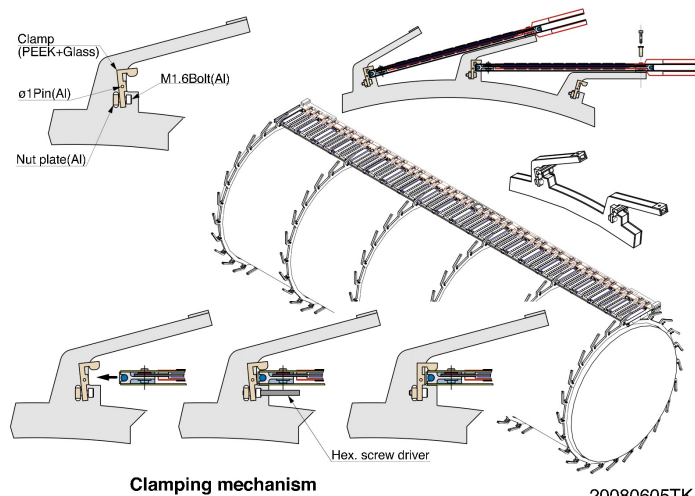


ATLAS – option des modules « Inner Tracker »

FACULTÉ DES SCIENCES

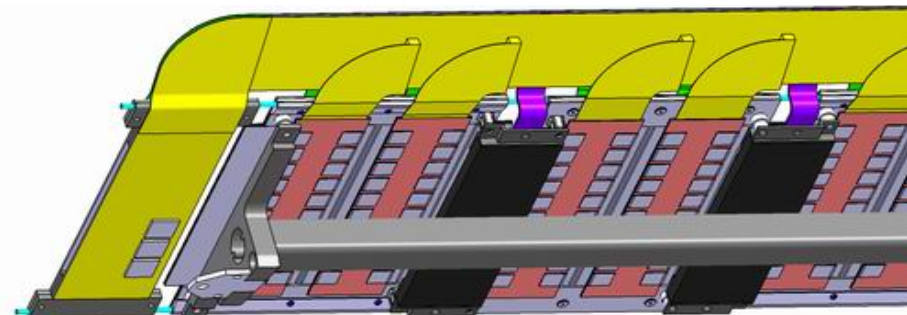
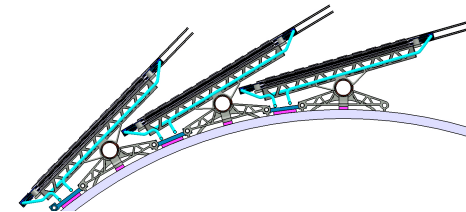
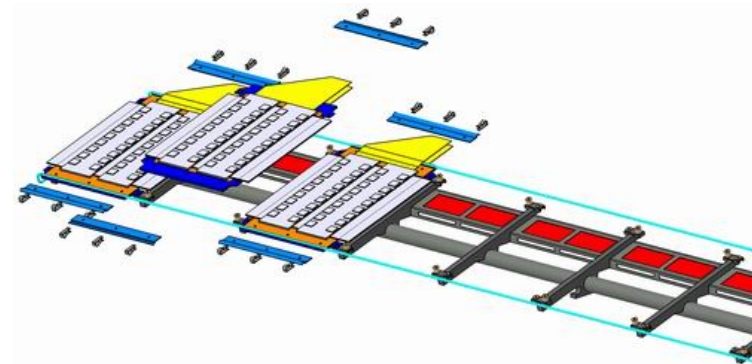


20080605TK



Clamping mechanism

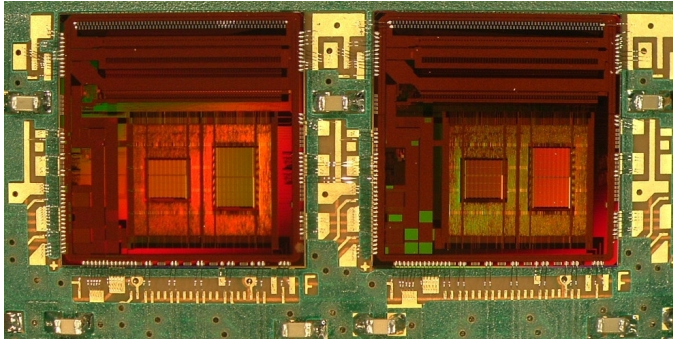
20080605TK



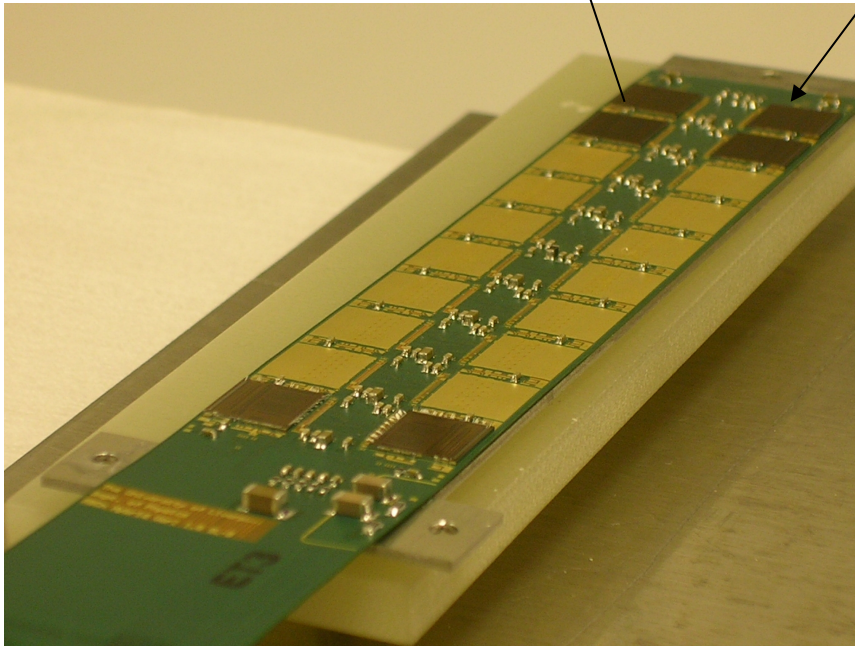
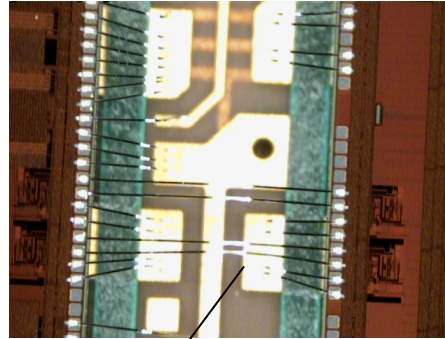
DPNC – mécanique, structure, assemblage, puce FE

DPNC - 091208

Neighbouring ABCns wire bonded



Inter-chip bonding



Hybrid Stuffed with Passives and 6 x ABCns

Flex thickness $\sim 270\mu\text{m}$

Weight $\leq 2\text{g}$ (unpopulated)

1. Un program séduisant pour quelques années à T2K (neutrino)
2. Le groupe astro-particule a plusieurs petits projets en planification et le grand projet européen CTA
3. Le groupe ATLAS a un futur court terme d'analyse très intéressant et plus long terme un énorme projet de construction pour SLHC

Nous prévoyons une période très chargée pour les activités des groupes mécanique et électronique

Donc:

- mes énormes remerciements pour notre collaboration de 2008
- reposez bien pendant les vacances
- 2009 + 2010 + Risquent être très chargés