Pierre Auger Observatory

studying the universe's highest energy particles

Status dell'esperimento Auger

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Dipartimento di Fisica

INFN Istituto Nazionale di Fisica Nucleare Sezione di Lecce

Summary

- **Introduzione**
- Produttività Scientifica
- Il programma di upgrade
- Attività a Lecce

Il progetto Pierre Auger: range di operatività

Studio della radiazione cosmica di altissima energia

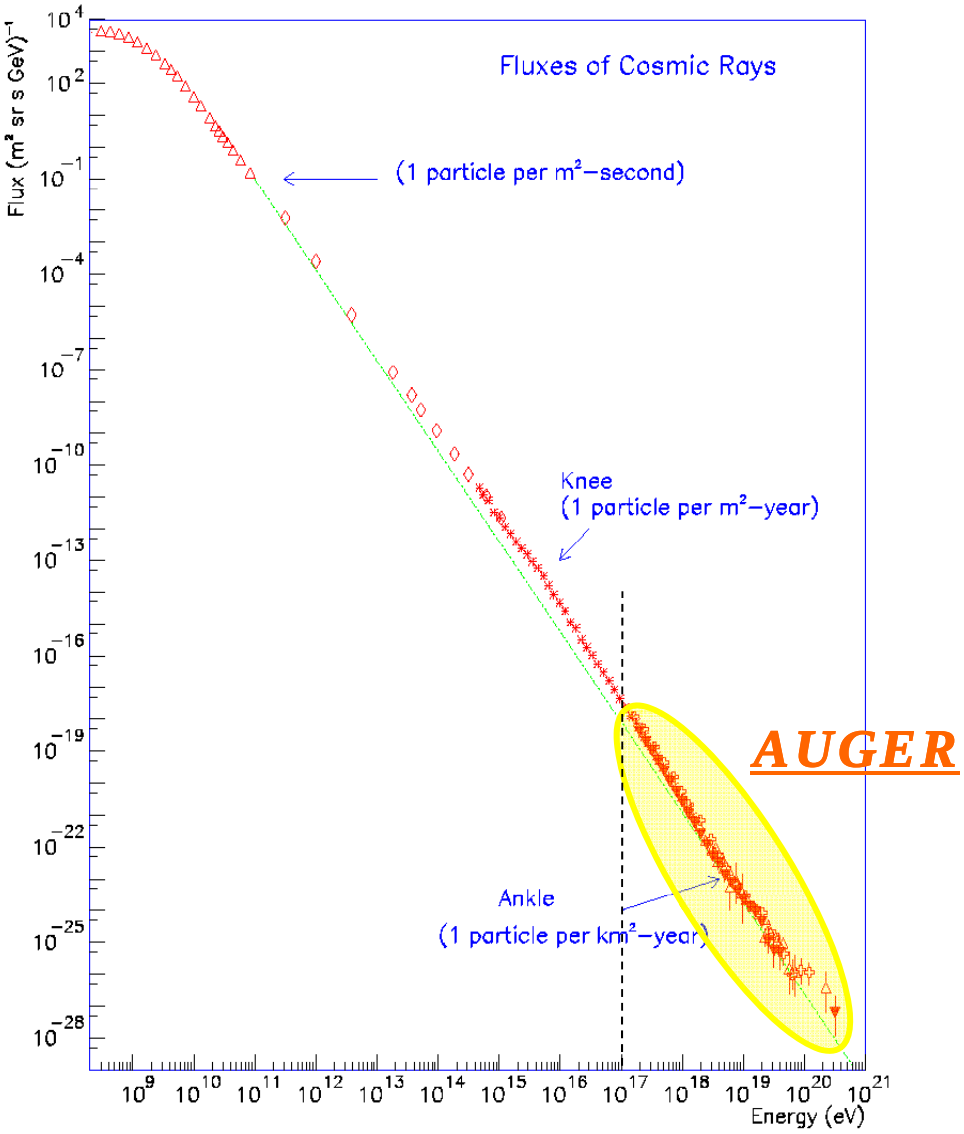
(10^{17}-10^{21}) eV

Flusso ad E>$10^{19.5}$ eV molto basso

1 particella / (km² sr secolo)

Apparato di grandi dimensioni: 3000 km² (Auger)

30 eventi/anno



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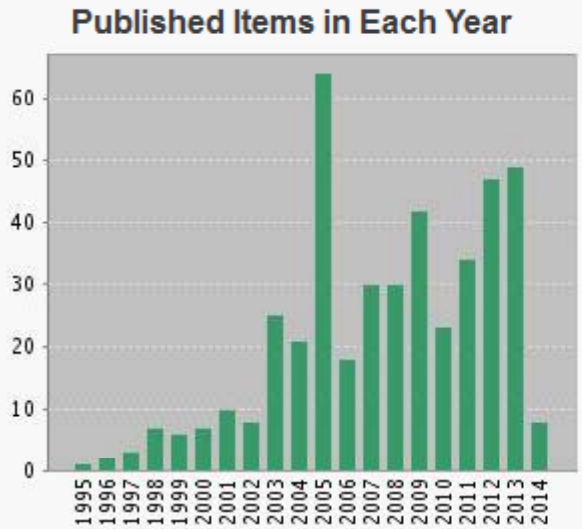
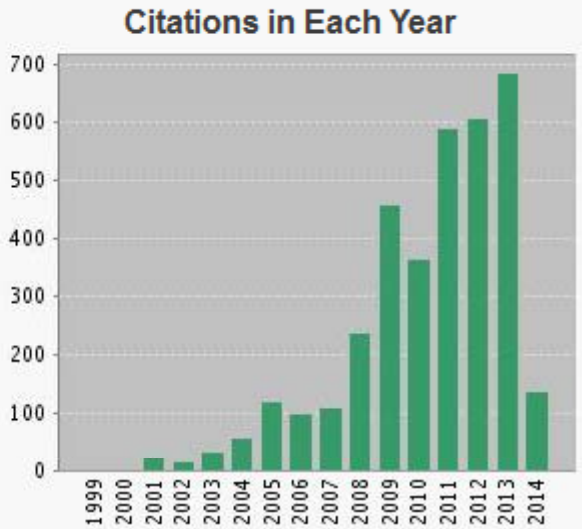
Produttività Scientifica della Collaborazione





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Citing Articles [?] :	1634
Citing Articles without self-citations [?] :	1329
Average Citations per Item [?] :	8.07
h-index [?] :	27

Nel 2013 127 presentazioni a conferenze

Fonte ISI 8/7/2014

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- **Il programma di upgrade**
- Attività a Lecce

The upgrade Science Case

1) The primary objective of the upgrade of the Auger Observatory is to elucidate the origin of the flux suppression and the mass composition at the highest energies…

2) The search for a flux contribution of protons up to the highest energies will be the second key science objective. We aim to reach a sensitivity to a contribution as small as 10%. …

3) …Estimating the number of muons in air showers from Auger data, a discrepancy between the observed and expected muon numbers is found. Therefore the third key science objective will be the study of extensive air showers and hadronic multiparticle production….

Roadmap Upgrade

Giugno 2013

2) Finance Board has appointed a SAC

1. Francis Halzen (chair)
2. Christian Spiering
3. Tom Gaisser
4. Roberto Battiston
5. Christophe de la Taille
6. Henry Sobel
7. Felix Mirabel

... will be at ICRC in Rio
and a first (informal) meeting
should be arranged

Roadmap Upgrade

1. Primo incontro che SAC a Rio (ICRC) Luglio 2013 DONE
2. Sottomissione Proposal Scientifico Settembre 2013 DONE
3. Primo parere sul caso scientifico Novembre 2013 DONE
4. Meeting SAC e Collaborazione Malargue Marzo 2014 DONE
5. Meeting FB Buenos Aires Marzo 2014 DONE
6. Sottomissione Proposal Tecnico Novembre 2014
7. Parere definitivo SAC fine 2014

Primo Parere del SAC Novembre 2013

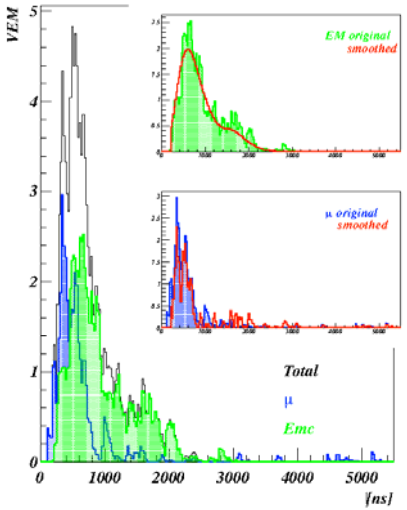
conclusions so far

slide from Francis Halzen shown at FB 11/2013

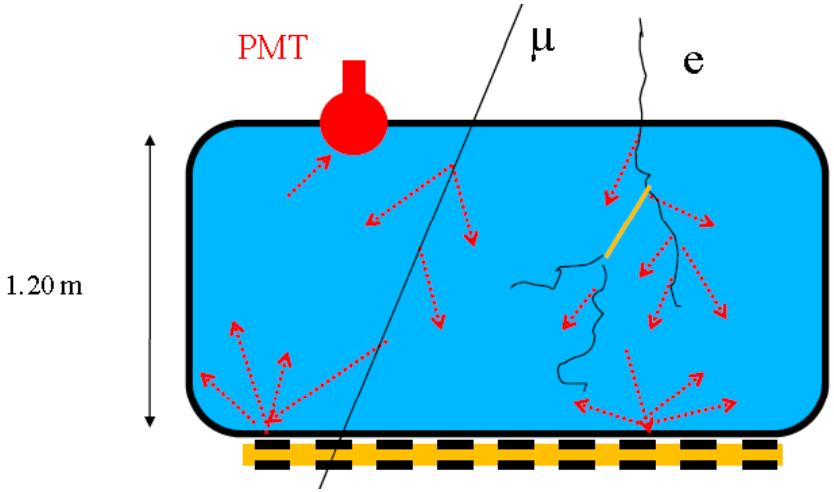
- Continued operation of the PAO detector difficult to justify without an upgrade program, the issues are not only statistical.
- The investment in the upgrade required to reach conclusive results from this generation of detectors is justified given the investment made so far.
- The PAO collaboration should define the upgrade plans after having completed the ongoing R&D.
- The goal of identifying the muon content and hence likelihood of proton versus heavy on an event by event basis is at this point the right way to go.
- Upgrade of the electronics by itself will be a step in this direction.
- Maximize impact of LHC opportunities and of better shower measurements by PAO itself to reduce model-dependence (cross section, multiplicity and Feynman-x dependence of the secondaries)

Visita del SAC e del FB a Malargue Marzo 2014

The AUGER upgrade Proposal

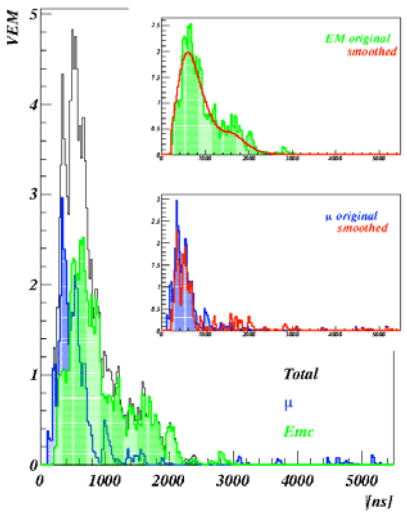


Migliorare quello che si è già sviluppato.



Modificare il rivelatore o aggiungerne un altro per separare la componente muonica da quella elettromagnetica.

The AUGER upgrade Proposal



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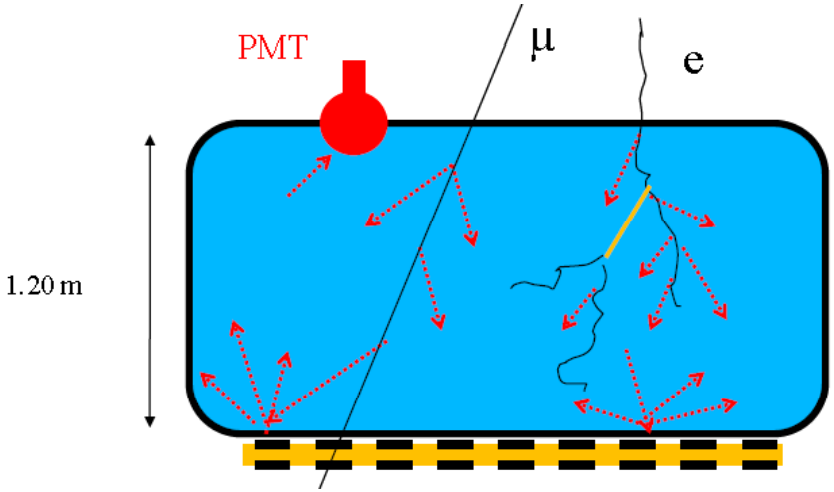
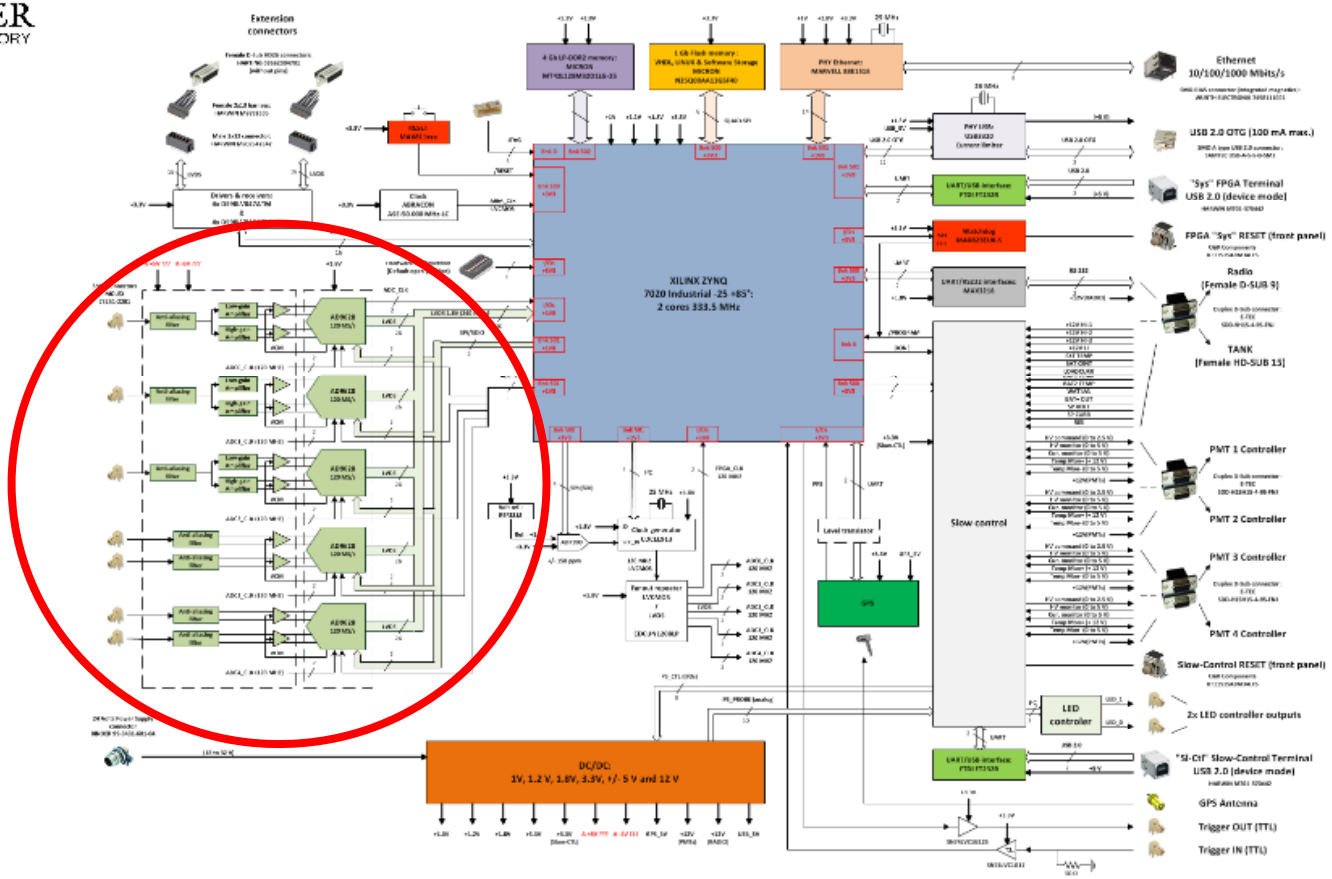


Modificare il rivelatore o aggiungerne un altro per separare la componente muonica da quella elettromagnetica.

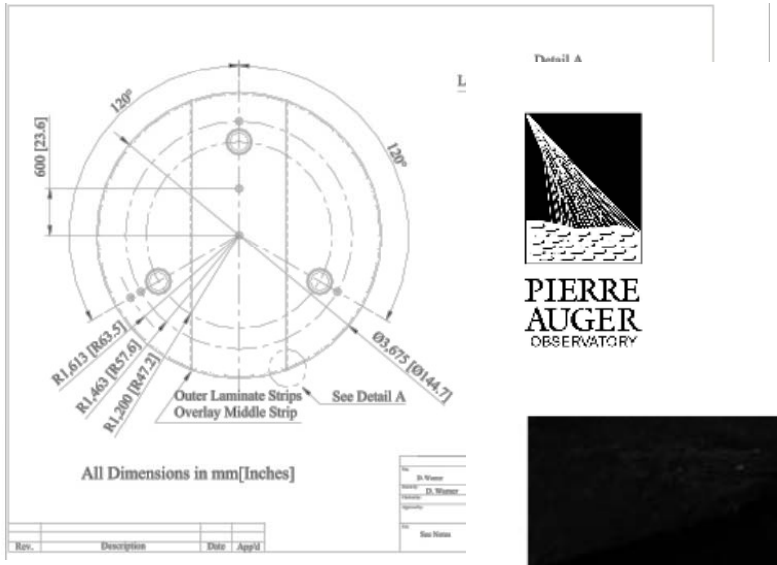
Faster electronics and extended dynamic range

PIERRE AUGER OBSERVATORY

UUB Block Diagram



Faster electronics and extended dynamic range



PIERRE AUGER OBSERVATORY

Small PMT test @ Malargue

- Hamamatzu R9065
28mm diameter
2% non linearity up to 80mA

- installed in the spare LED window (Didi Tank)

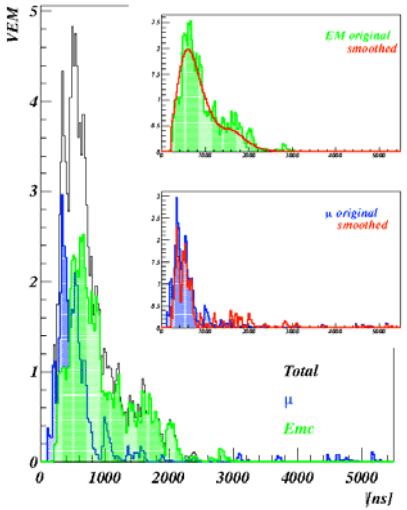
- photocatode area ratio

$$\frac{S^{XP1805}}{S^{R6095}} \sim 75$$

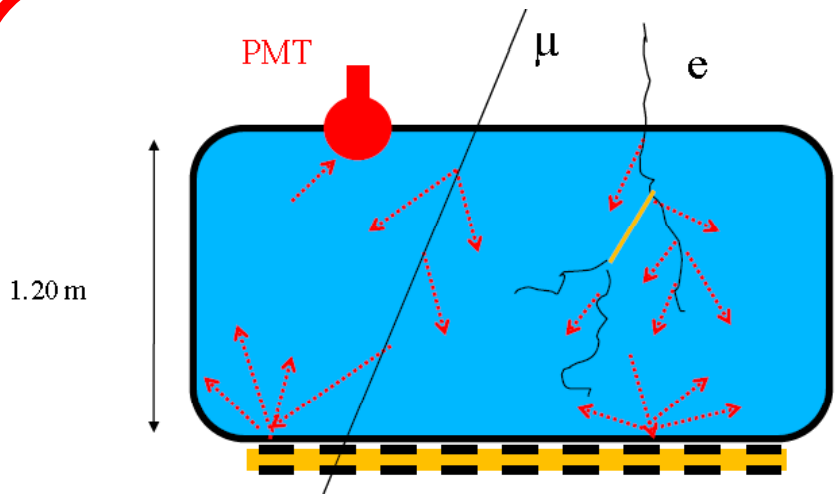
- High voltage from a separate module

- acquired by UB in place of dynode of PMT 3

The AUGER upgrade Proposal



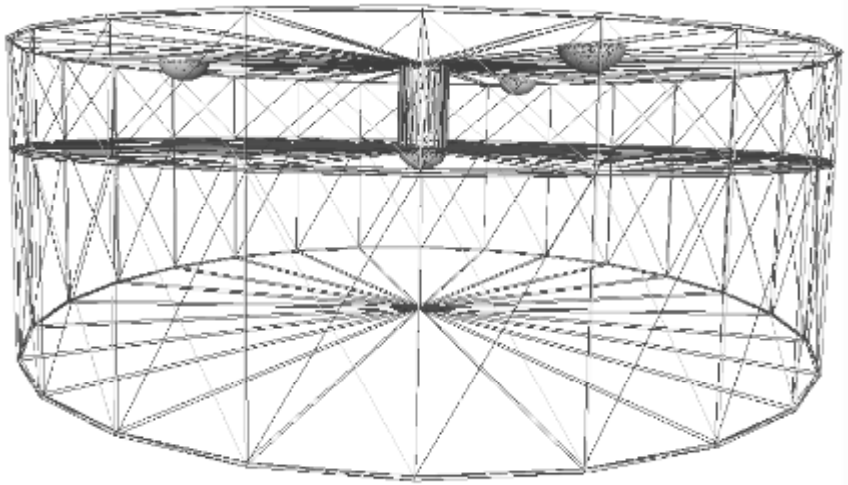
Migliorare quello che si è già sviluppato.

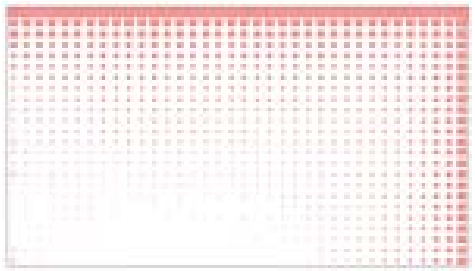


Modificare il rivelatore o aggiungerne un altro per separare la componente muonica da quella elettromagnetica.

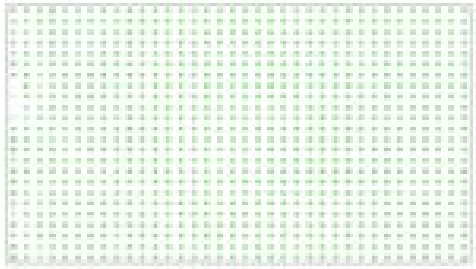
New detectors

PROPOSAL FOR A SEGMENTED WATER CHERENKOV ARRAY





Luce emessa da e.m.



Luce emessa da μ

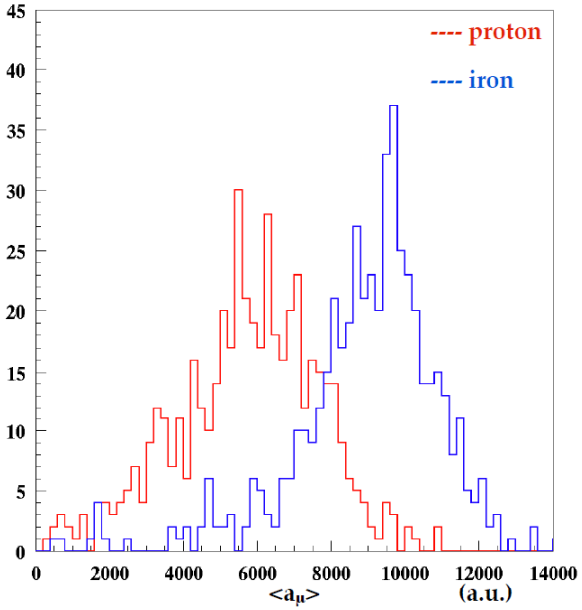
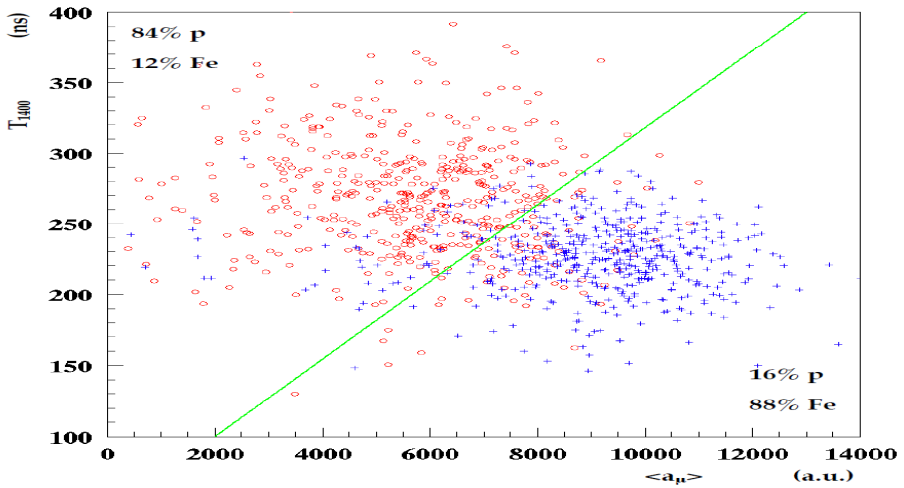


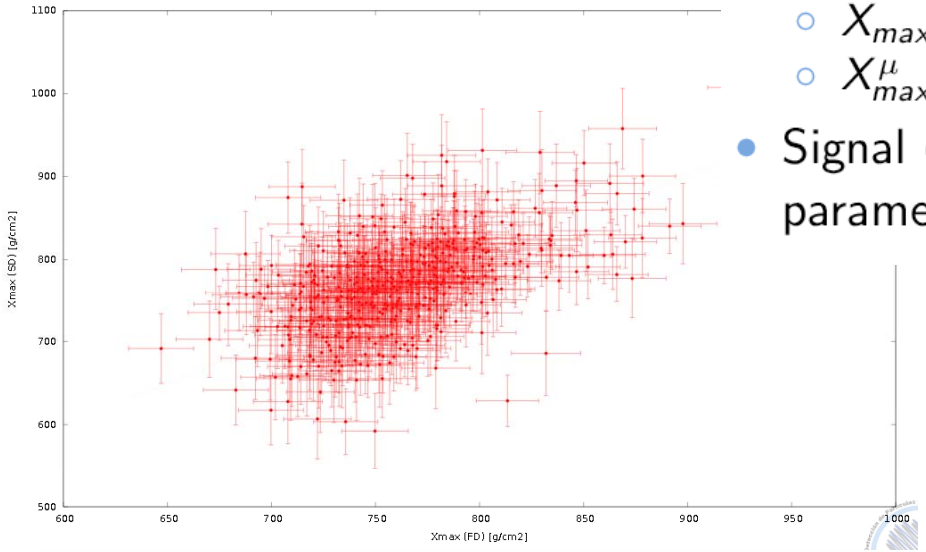
Figure 4: Reconstructed muon size (arbitrary units) for proton (red curve) and iron (blue curve). The resolution is about 30 and 15% respectively.

$$\begin{pmatrix} S_{top} \\ S_{bot} \end{pmatrix} = \begin{pmatrix} a & b \\ 1-a & 1-b \end{pmatrix} \begin{pmatrix} S_{em} \\ S_{\mu} \end{pmatrix}$$

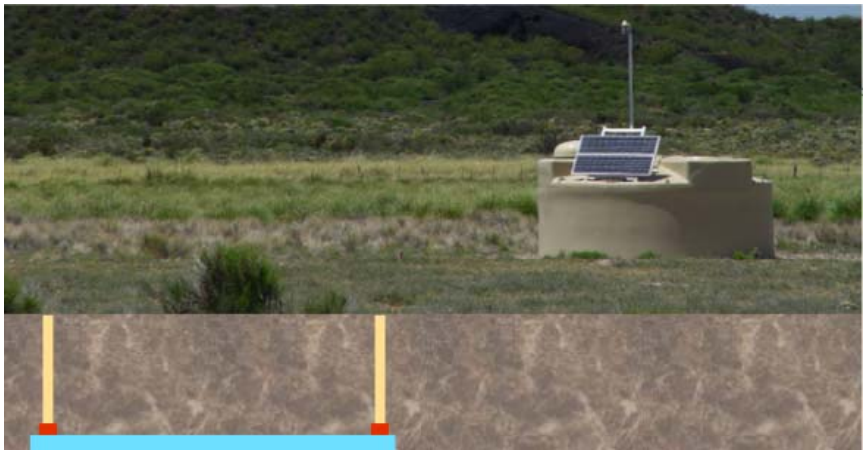


ASCII Auger Scintillator for Composition II

- Based on the Universality:
- EAS sum of 4 components:
  - pure EM
  - Muons
  - EM from muon decays
  - EM from direct pion jets
- EAS described by macro parameters:
  - Geometry
  - Energy
  - N_μ
  - X_{max}
  - X^{μ}_{max}
- Signal (both integral and time structure) dependence on these parameters derived from MC (QGSJetII-03 and EPOS-1.99)

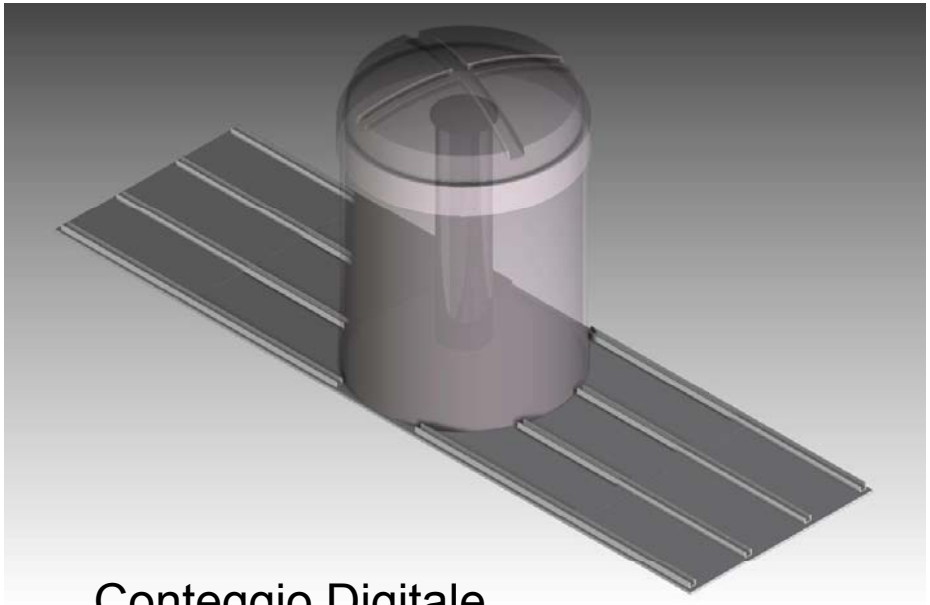


New detectors



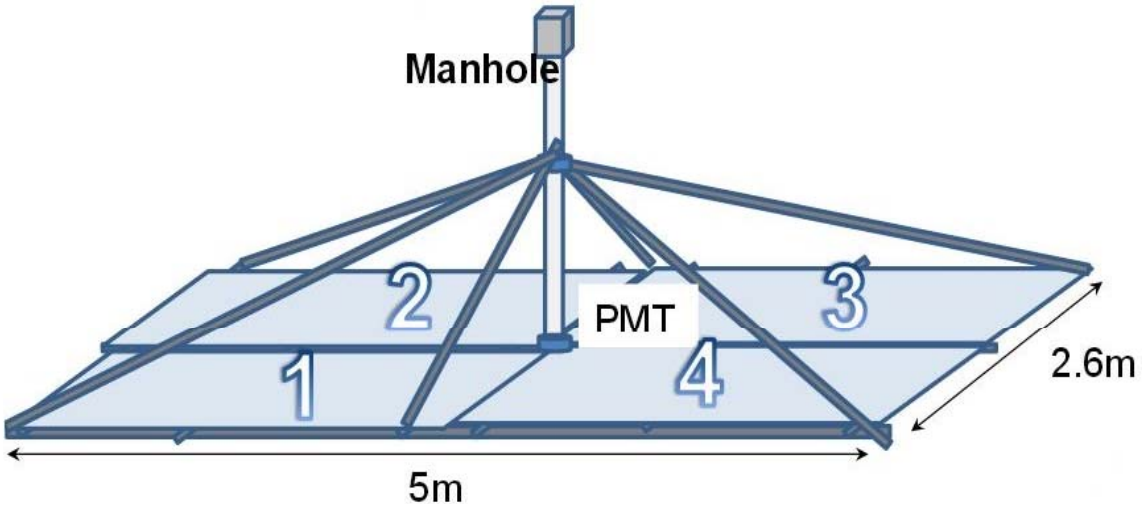
SCINTILLATORI UNDERGROUND

AMIGA-Grande



Conteggio Digitale

TOSCA



Conteggio Integrale

The Upgrade Committee

Novembre 2013

Members of Committee*

1) Ad van den Berg
2) Bruce Dawson
3) Brian Fick
4) Hans Klages
5) Matthias Kleifges
6) Jan Ridky
7) Fred Sarazin
8) Radomir Smida

Plus ex-officio members:

- Paul Mantsch (secretary)
  (→ bi-monthly reports to collaboration)
- Jonny Kleinfeller as PM
- 2 members of SAC as consultants to participate in special meetings discussions upon invitation

** We have selected a committee of respected and experienced members of the collaboration and we put a real burden on them.*

We hope you agree with this group of your colleagues will arrive at a fair decision.

Golden Analysis US Giugno 2014

Giugno 2014

Recommendations

BY2015

Upgrade Committee

Background

- We have only one shot to move the field forward for the next ground-based array (beyond Auger and TA)
- Essential to measure the proton fraction at the highest energies or to set an upper limit (10%)
- Need Full Array Upgrade and rapid start of data taking, latest mid 2018
- For studies of air-shower physics and for cross checks of the Full Array Upgrade add a complementary muon detection method which incorporates AMIGA

UC recommendations

- The UC recommends that only ASCII and LSD are being considered as the options for the full array upgrade
- Based on our knowledge, the UC recommends to use a scintillator-based design for the complementary muon detection method
- The UC recommends that AMIGA becomes part of Auger to do science at the lowest energy (2007)

Complementary Detector

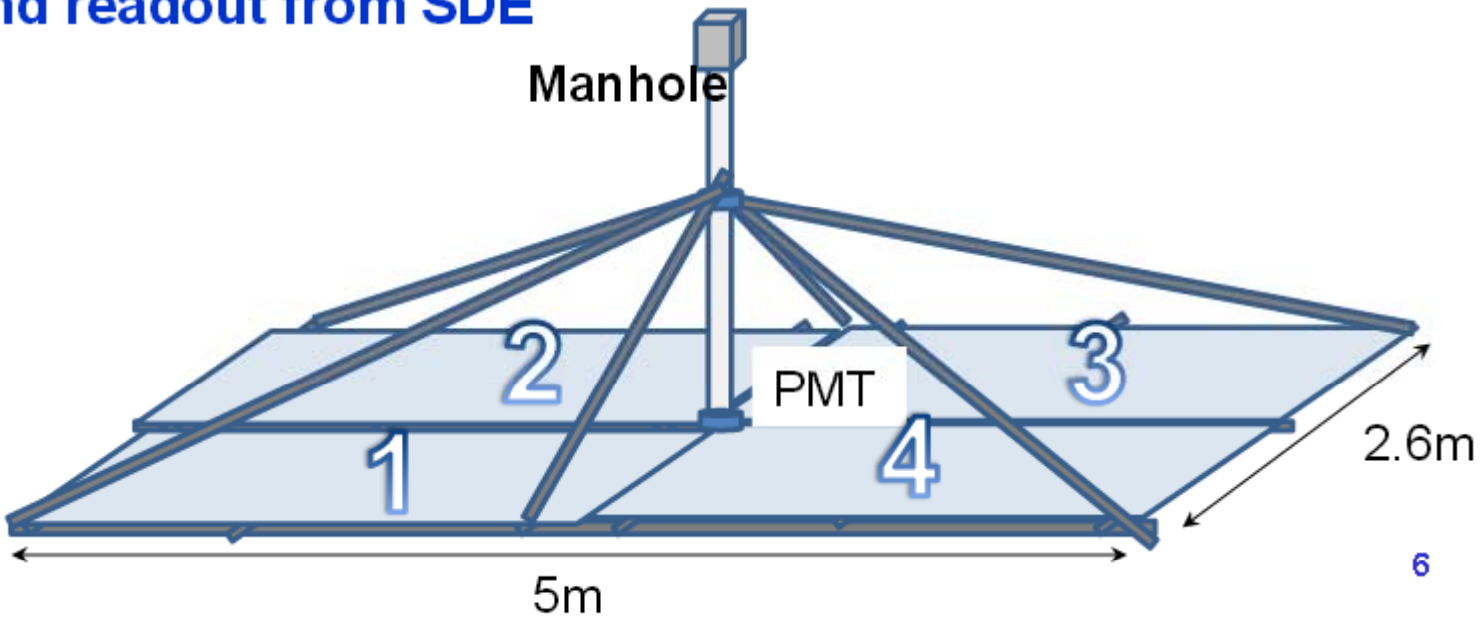
- For studies of air-shower physics the detector requirements: (covered area, station size, resolution) needs to be defined
- Beyond AMIGA the UC recommends:
  - Buried scintillators equipped with PMTs
  - Integrated electronics with P < 1 W
  - Equipped with calibration tools for muon flux
  - Detector size ≥ 10 m^2
- Need design and WBS before November 5th

TOSCA Design

- Draw from experience with AMIGA and TOSCA-A modules
  - proven technologies and materials
- Significant simplifications for sensors, readout, mechanics
  - Single channel analog PMT readout
    - avoid expensive, harder-to-operate MultiPixel PMTs, or solution that need significant R&D programs (eg SiPM)
    - no dedicated power, electronics, DAQ, calibration and reconstruction codes
  - Industrially made parts
    - EPS bars, WLS fibers, PMT
    - External vessel, styrofoam interior case
  - Straightforward assembly
    - No alignment, no gluing
    - Can be done anywhere
- Improved performances
  - Higher light output, more uniformity
- Strong synergies with other upgrades

TOSCA Design

- Four 2.5m² flat modules for 10m² total active surface
  - reduced light attenuation
  - Simplified integration, test, handling
  - Modules are assembled/shipped to PAO, complete detector can be transported to the field
- One buried PMT, accessible from the surface
  - Robust, inexpensive, single channel PMT
  - HV and readout from SDE



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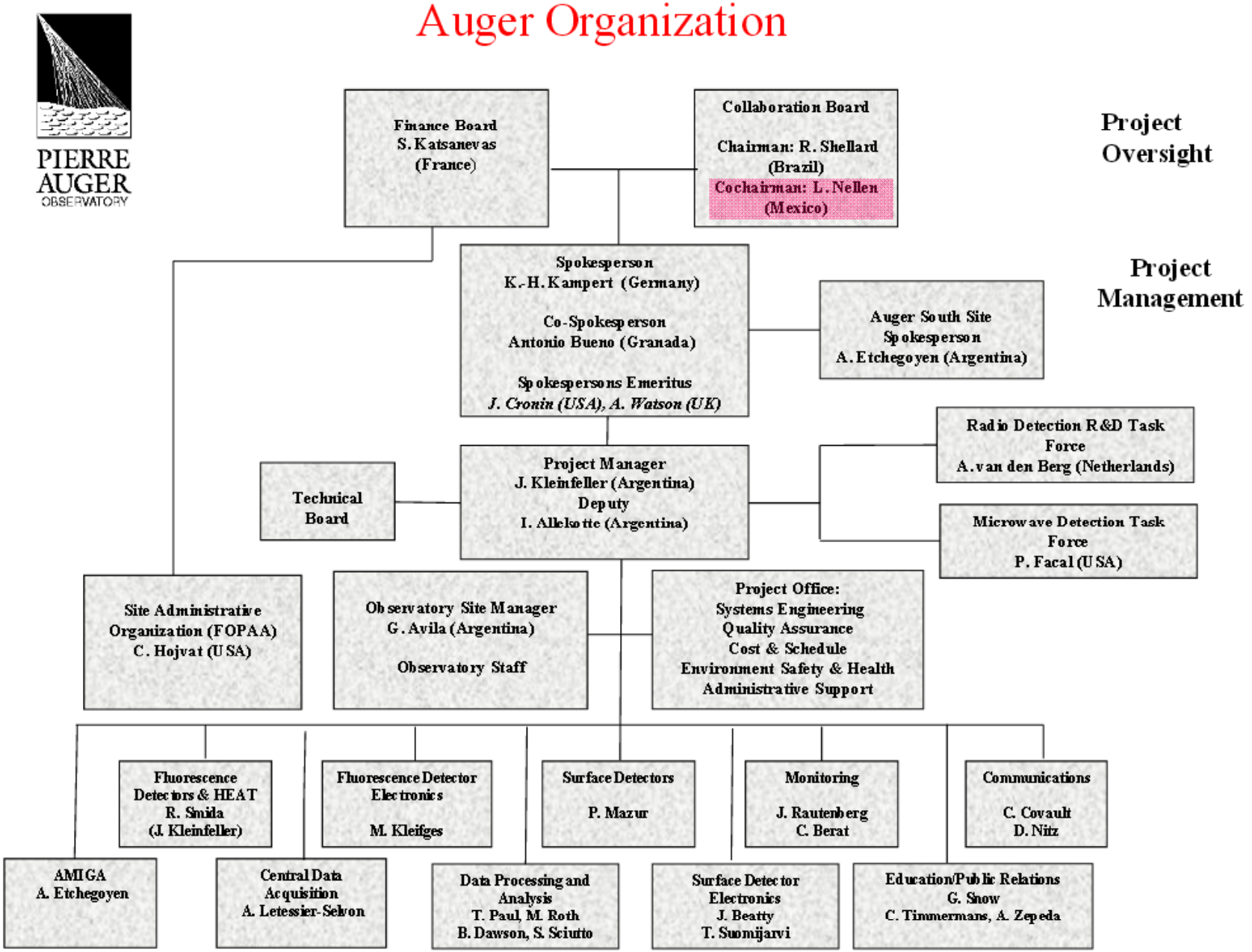
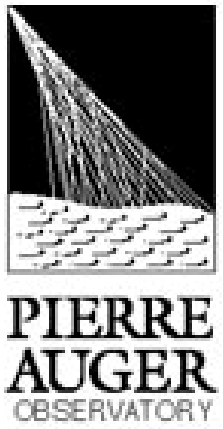
Lorenzo P. eletto Co-Chairman del Collaboration Board





WP1 for Auger SDE upgrade

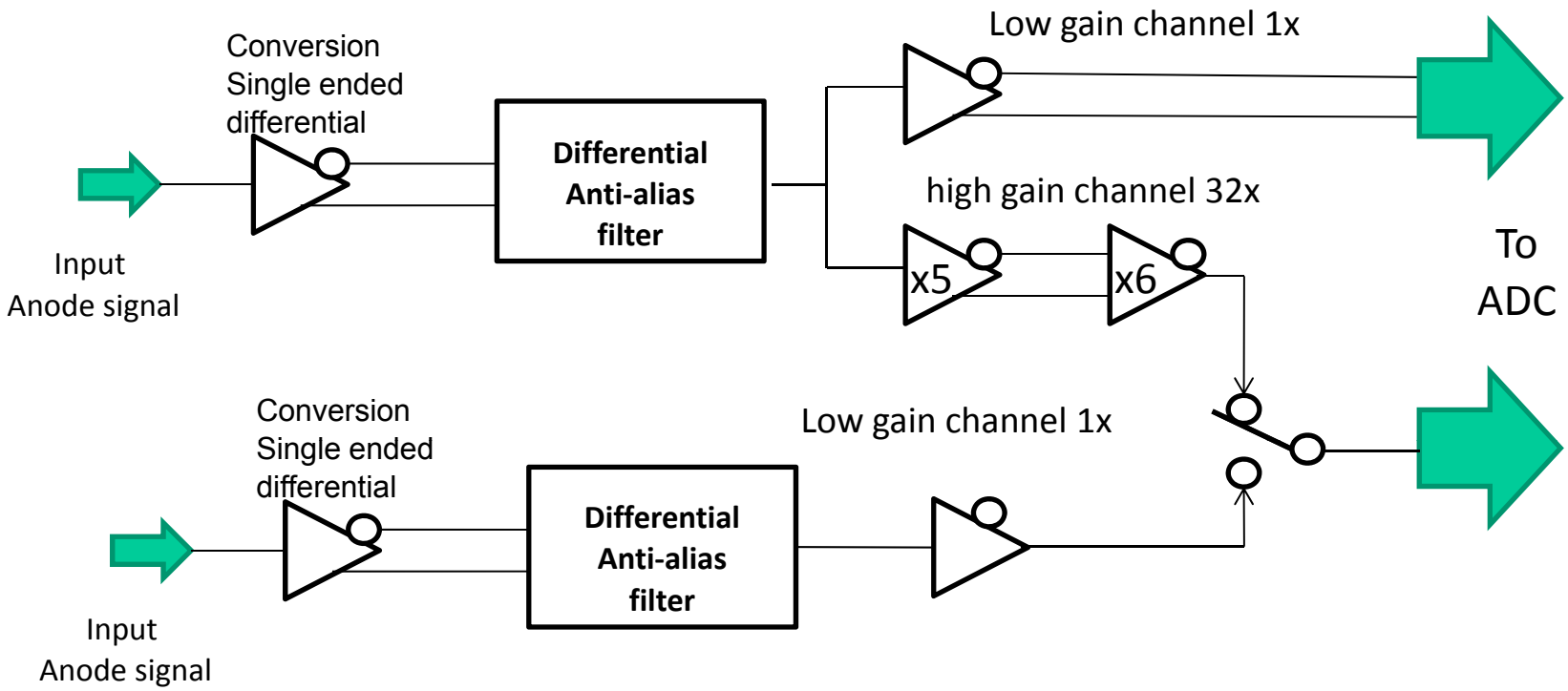
http://elettronica.le.infn.it/?page_id=216

R. Assiro, P. Creti, G. Marsella – Lecce group

Input type 3 x1

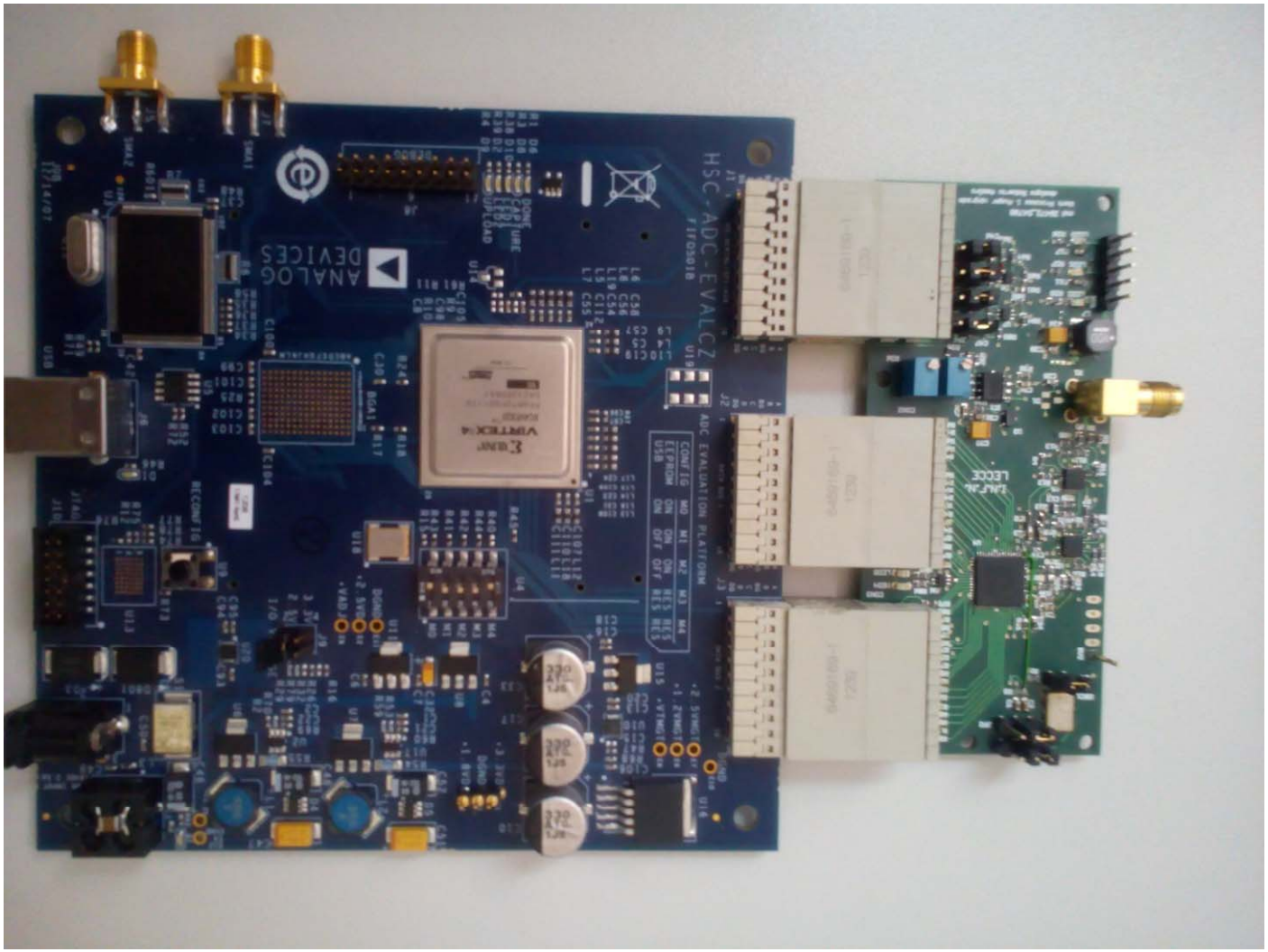
This stage is intended to satisfy 2 possible alternative options:

- Two separated inputs (like type 2)
- On input splitted in 2 (like type 1)



In the implemented design, only 4 OpAmp will be used (two chips)

New Test Printed circuit



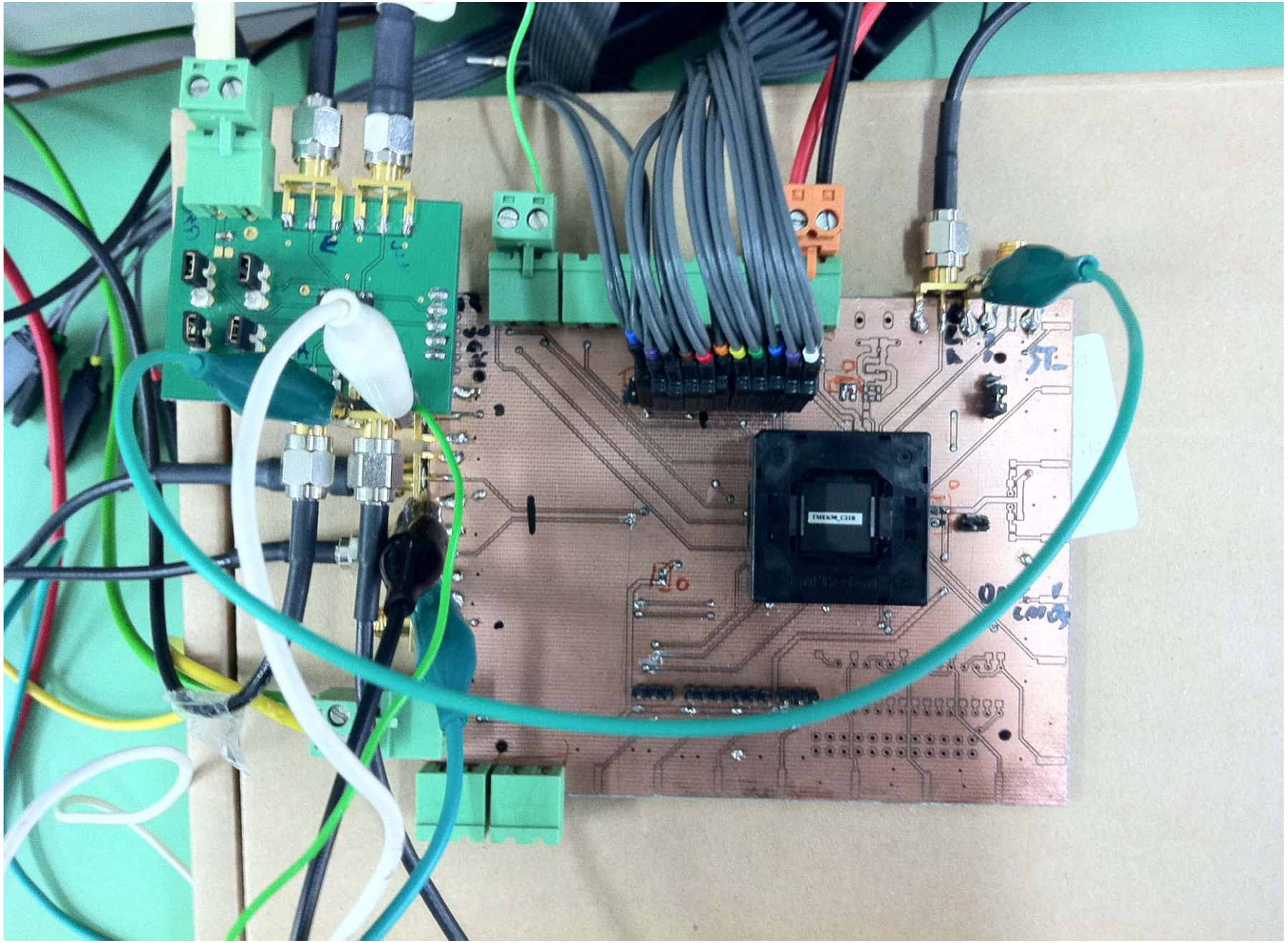
A new printed circuit has been designed to complete the front-end tests

The design make it compatible with the Analog Device Evaluation board and DAQ system

Under debug

R. Assiro, P. Creti, G. Marsella – Lecce group

Chip Setup measurement



Auger upgrade: Introduction of a small PMT

Total dynamic range with current electronics: from few to about $6x10^4$ photoelectrons (about 700 VEM)

→ Particle density measurements up to about 500-600 m from the shower core.

~50% of events have at least 1 saturated station in the energy range $10^{19.5}$-$10^{19.6}$ eV.
Extension of the linear dynamic range: addition of a fourth PMT with a smaller sensitive area. Scaling of the collecting area compared to the existing PMTs directly results in an extension of the dynamic range when the small one is operated at the same gain of the others and the linearity is the same.

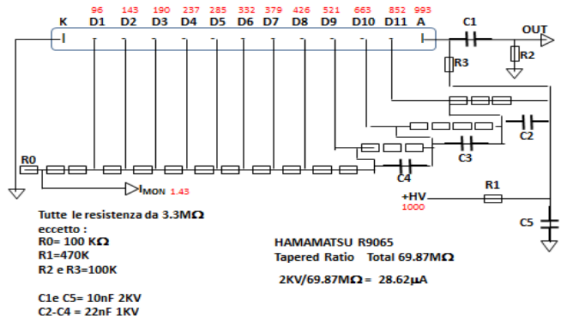
SPMT Candidate: Hamamatsu R6095 having a Slarge/Ssmall ~75

Test of the SPMT in Lecce (R6095)

Starting from the Experience of XP1805 test:

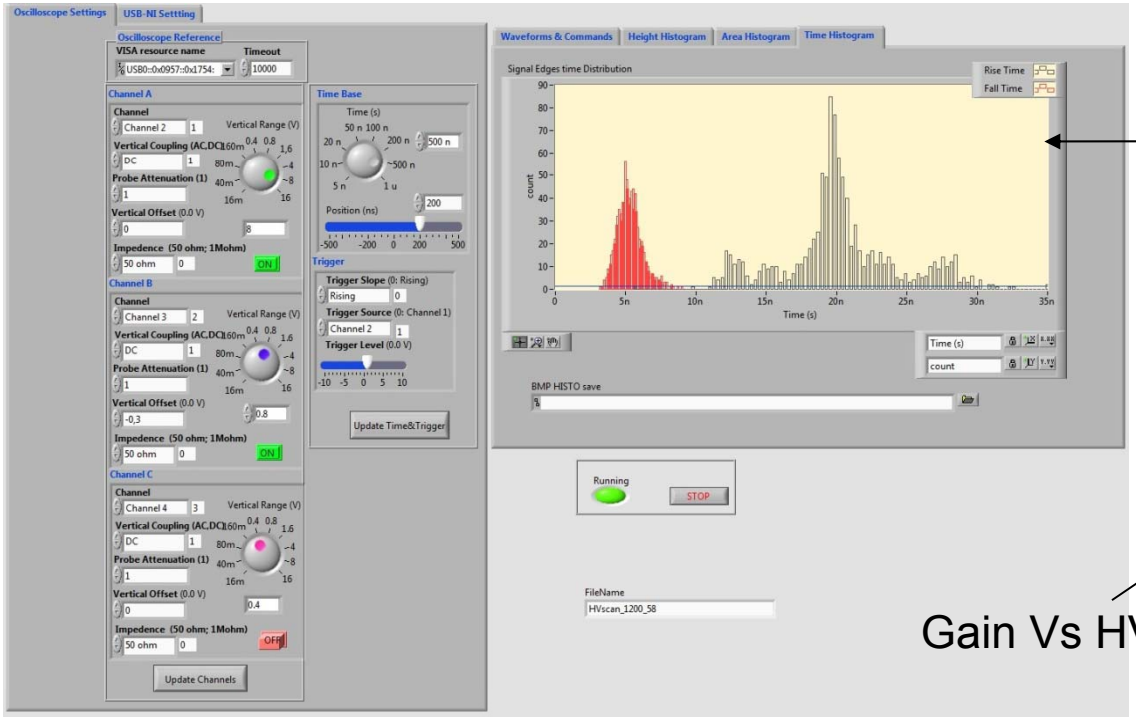
Dark box housing the detector and the light source (Supports from P.Fiore).
Detector under test (SPMT-R6095) looking upwards.
A blue LED (470 nm, 45 deg viewing angle) is used and in order to have a fast turn-on turn-off response an appropriate LED driver has been designed (A.Corvaglia).

TOSCA prototype - Tapered ratio divider for R6095 PMTs
R_{TOT} = 70MΩ



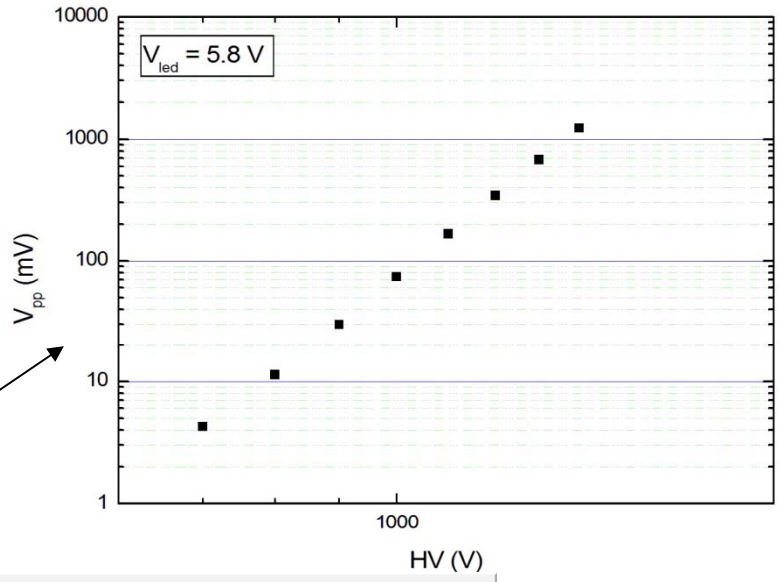
A Tapered Ratio Divider has been built in Lecce. (A.Corvaglia, P.Primiceri).
MODS for Ground Coupling (C.Pinto)

Test of the SPMT in Lecce (R6095)



LabView DAQ with online Monitoring:

e.g. Fall Rise Time of the PMT signal

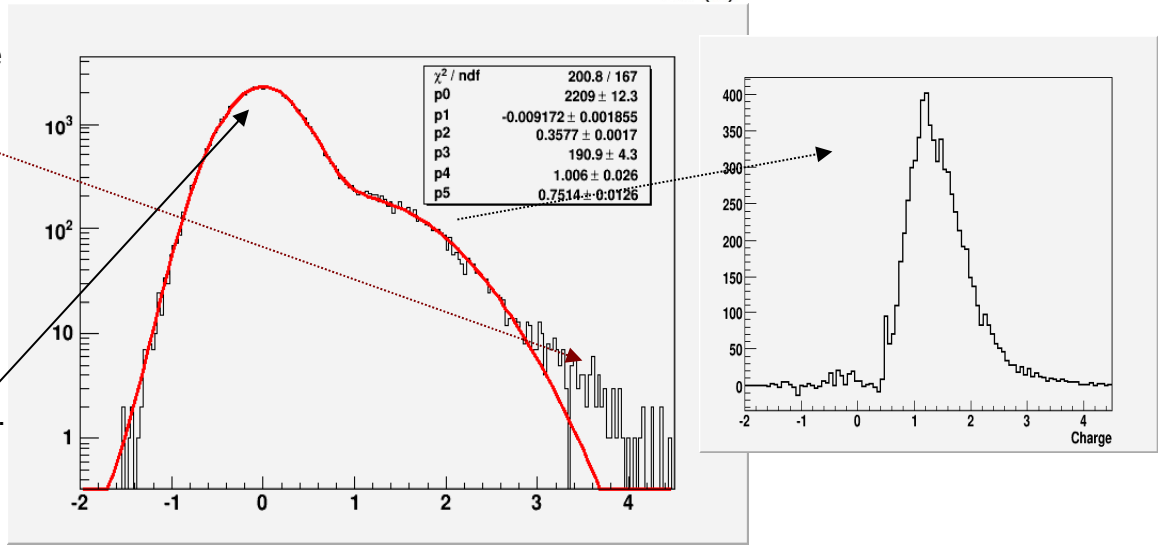


Gain Vs HV

The SPE of the system is distinguished from higher order peaks (i.e. The response of the system to multiple photons), and from the pedestal.

To distinguish the SPE from higher order peak, the pulsed light source has been tuned to have
90% pedestal, and 10% signal for Poisson distribution of average 0.1 photo electrons. The tuning is performed by mean of a transmittance filter.

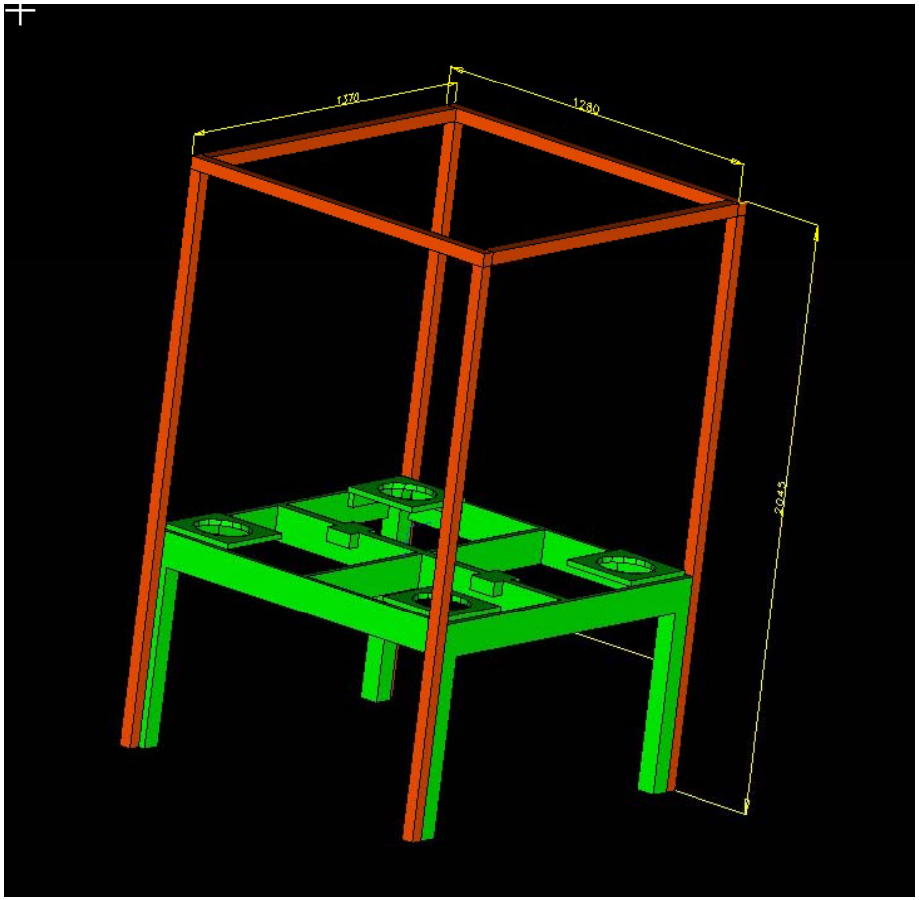
To distinguish rom the pedestal- an offline analysis is implemented.



New Design

LED Motion system

Already financed by INFN for 2014



1) 2 x Kit fine corsa per asse X e Y con contatto sensore
4 x supporto in alluminio per fine corsa
4 x Fine corsa induttivo PNP-NO o NC

4) 1 x Kit di 4 staffe in alluminio per bloccaggio/fissaggio

5) 1 x Albero di giunzione in alluminio tra i due assi X e X1
Sia anteriore che posteriore

6) 2 x Piastre di collegamento carro-base CCL per assi X e Y
+ 8 staffe in alluminio per fissaggio assi

7) 2 x Attacco motore diretto con giunto per assi X + Y
Supporto in alluminio con giunto a morsetto

8) 4 x Giunti di fissaggio barre di giunzione X e X1
Giunto in alluminio a morsetto + espansione

9) 1 x Kit inserti per il fissaggio catenarie (20 pezzi)

10) 2 x angolari a L in alluminio per supporto catenarie

11) 2 x Catenarie per cavi motori e fine corsa

12) 2 x Riduttori Epicicloidali diametro 60mm Riduzione 1:6

13) Disegni progettuali per piastre e supporti vari

14) Assemblaggio meccanico completo del sistema presso di noi

15) Cavi Motori passo – passo e fine corsa lunghezza 3m

16) Cablaggio a bordo sistema motori + fine corsa

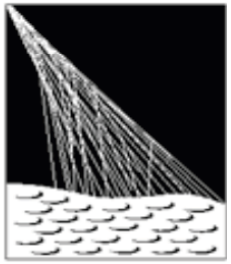
17) 1 x Controllo SHS con motori passo-passo
Tipo LBM 2010 TS2 / S2 con interfaccia RS 485
con interfaccia per gestione tramite LAB WIEW

20) 2 x Motori passo-passo Tipo SLH 2434 400 4 AX00 da 3 Nm

21) 1 x Smontaggio del sistema per il trasporto

22) 1 x Cassa di imballaggio in legno per spedizione sistema smontato
Di dimensioni circa 3500x500x300mm

G. Fiore, G. Marsella

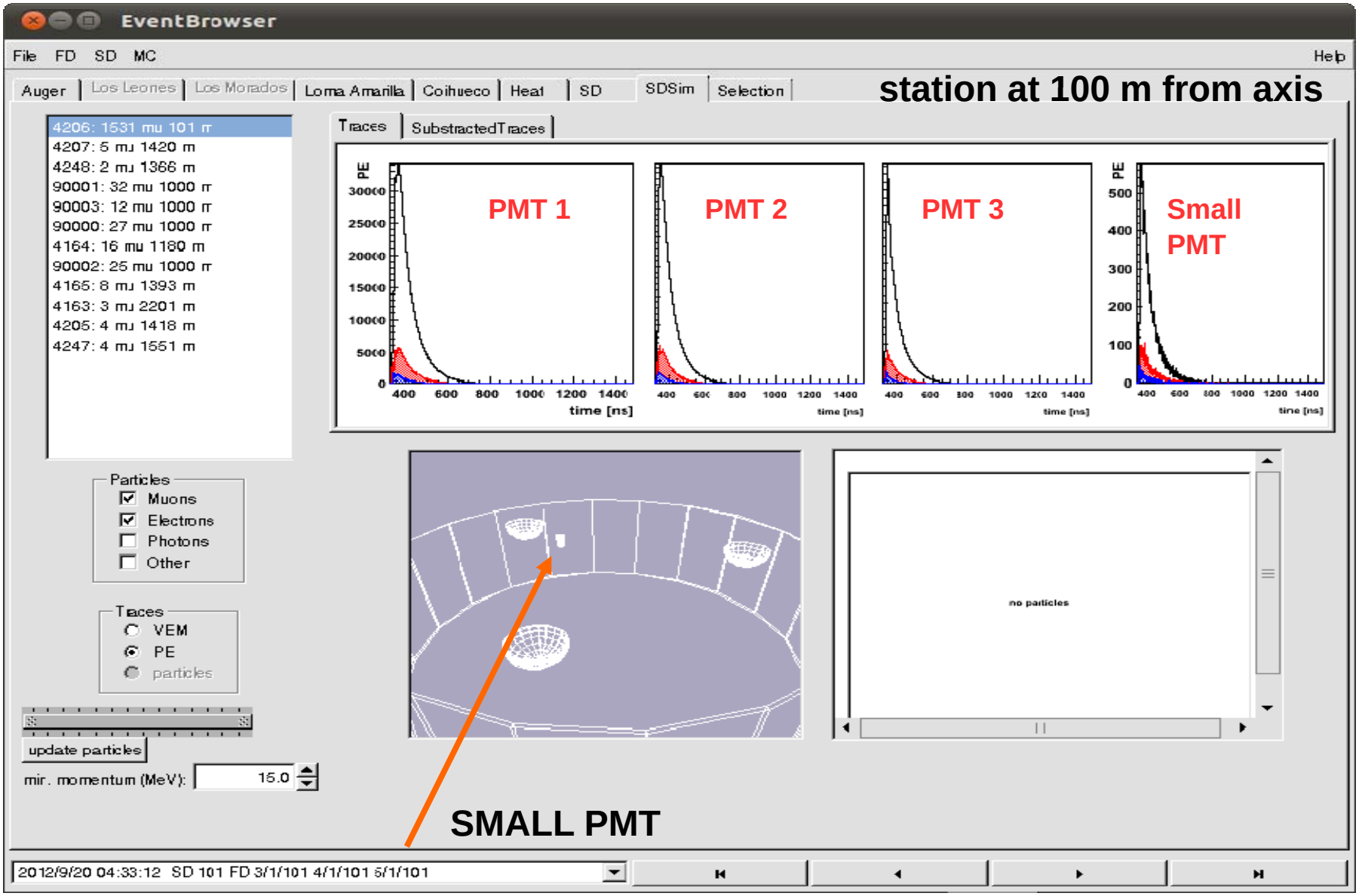


Implementation of the Small PMT in the Offline and first results

Viviana Scherini and Lorenzo Perrone

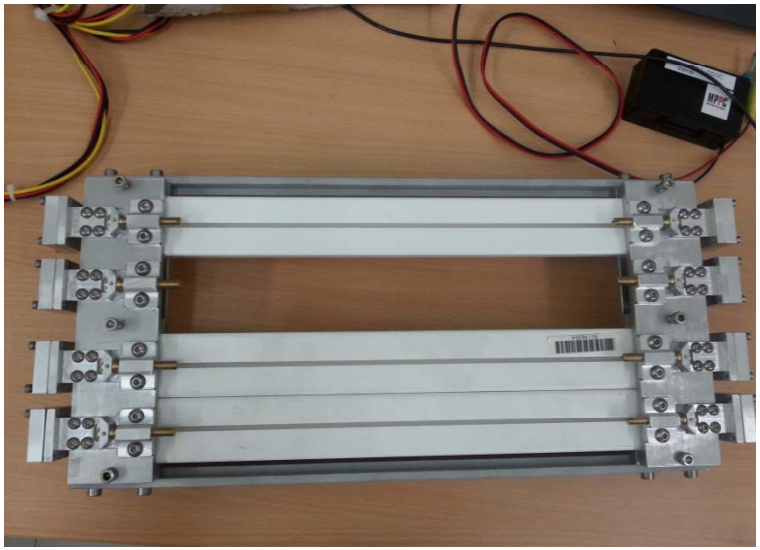
Photo-electron traces

10 EeV, proton
zenith=32°
Saturated

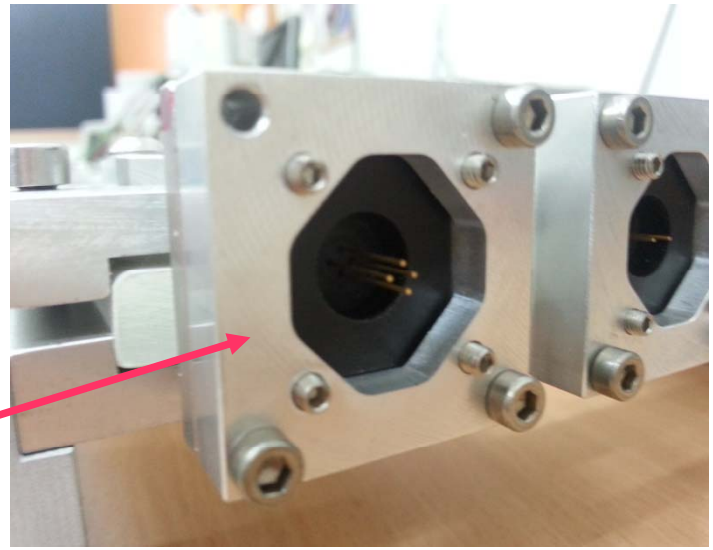


Viviana Scherini and Lorenzo Perrone

SiPM and ToscaA Scintillators (First TestSetup)



Using the extruded scintillators from AMIGA/ToscaA project we have assembled a Mini-module.
The scintillator bars are equipped with Light guide and read on both sides from SiPM.
4 different types of SiPM are under study.



G Fiore and
G Cataldi MR Coluccia

Fast exposure

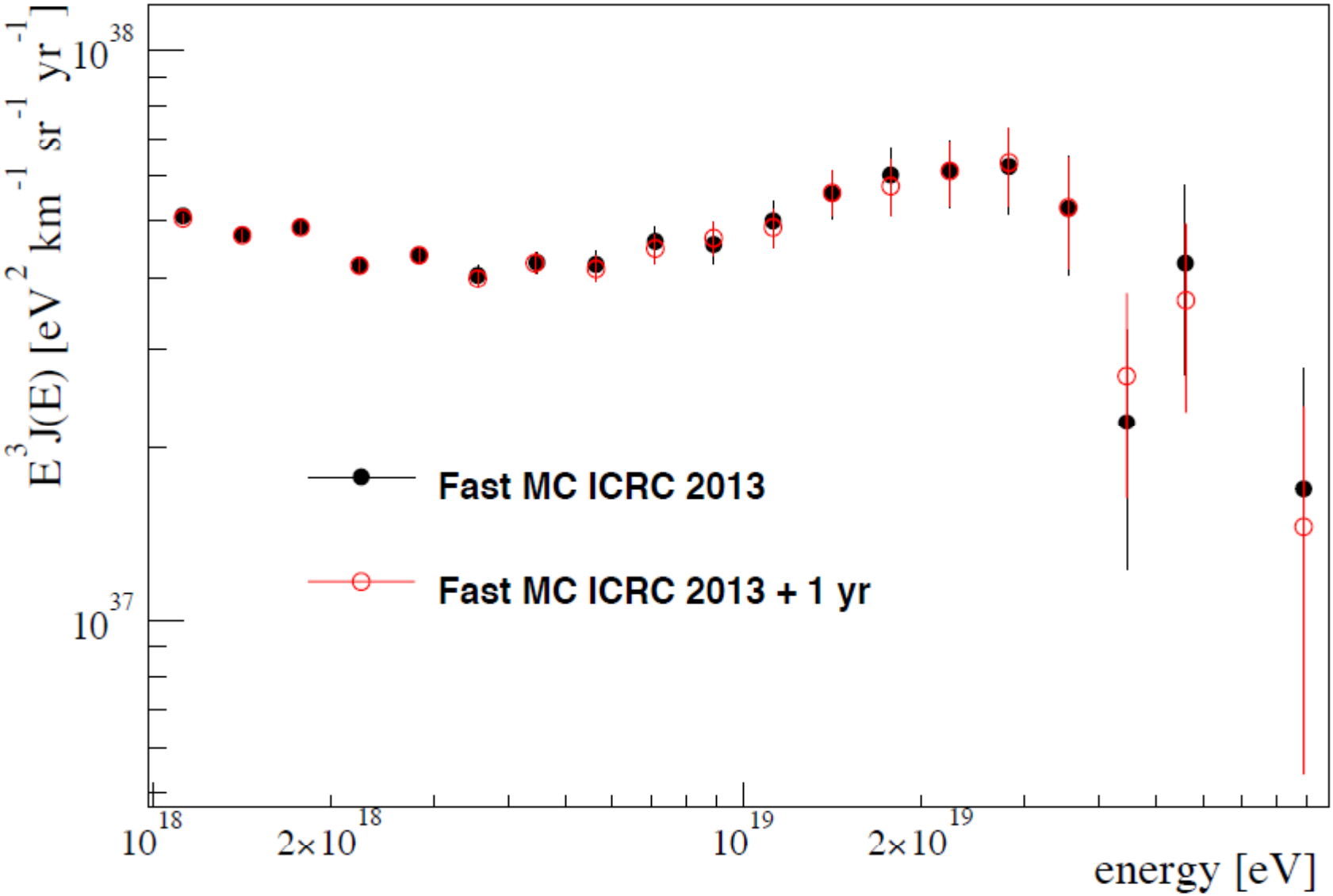
Motivations

- Huge statistics is needed to have a reliable results
- a lot of computing and time resources are needed to calculate the hybrid exposure with the standard method
- only few people in the Collaboration have access to it
- ~millions of simulated events are difficult to manage
- it can happen that time bins with a low uptime are not sampled

The cuts used for the hybrid spectrum are very hard, e.g fiducial volume/FOV, atmosphere, clouds, profile fit etc:

- all the pathological situations are removed
- the selected events are very close to the ones of an ideal detector.
- the sampling of all the detector configurations (missing telescopes, tanks) is the most important part

Spectrum Update



L. Perrone V. Scherini (F. Salamida)

Directional search for photons

A. Aab et al.[the Pierre Auger Coll.] 2014 ApJ 789 160

$E>10^{17.3}$ eV

→ No source Identified

→ Targeted searches ongoing

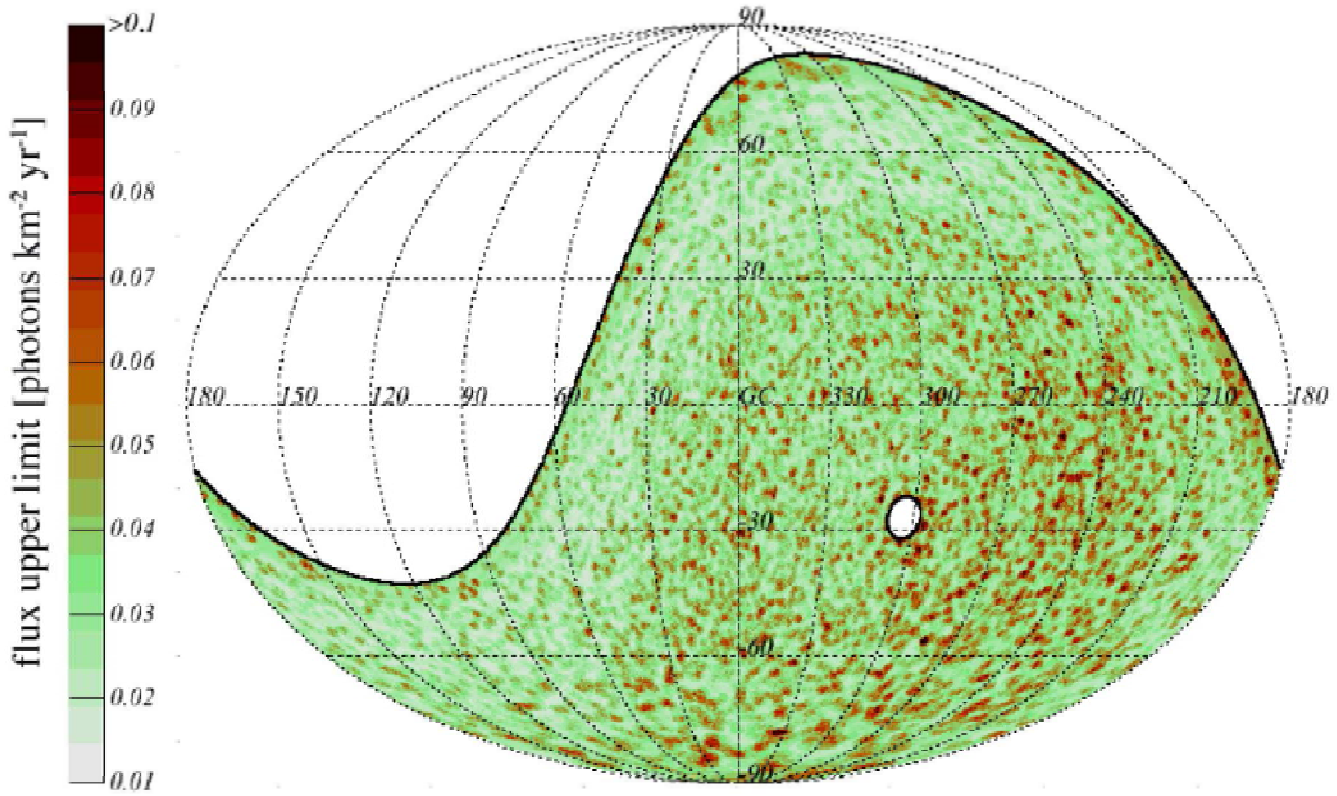


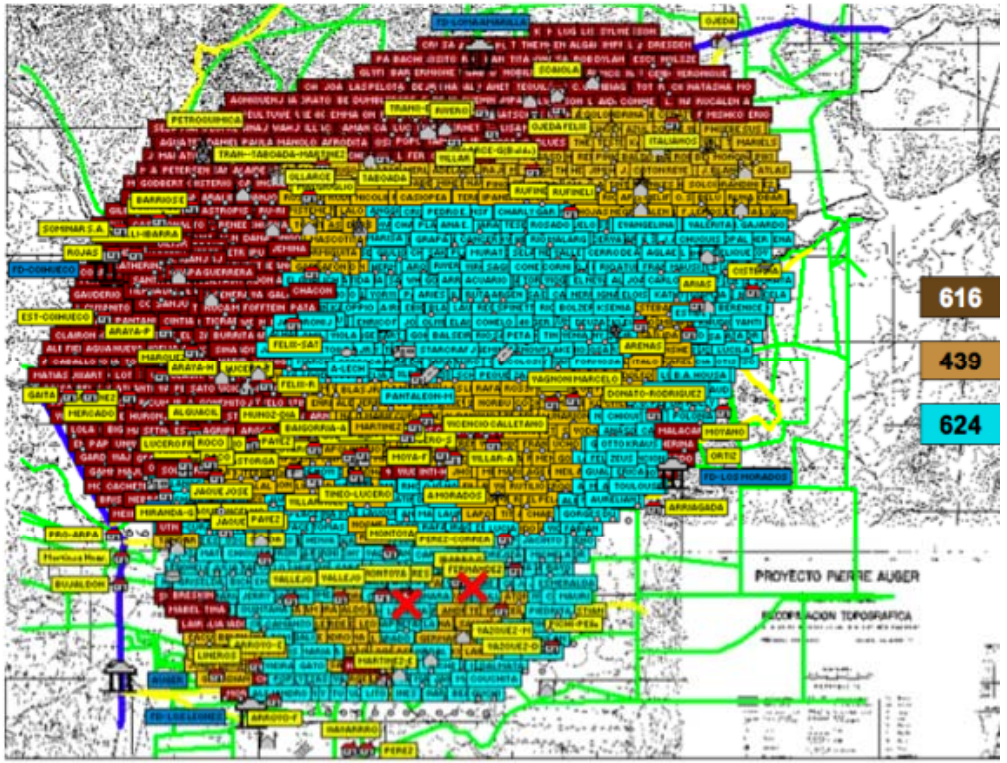
Fig. 10.— Celestial map of photon flux upper limits in photons km^{-2} yr^{-1} illustrated in Galactic coordinates.

Backup

The Blue Area

From G. Ávila and Miguel:

- **Information:**
- Worst places known by local staff
- 2 Positions: between Cullen and Rocío, and San Martín
- Hole of 0.5m x 0.5m
- **Identical result in both positions:**
- Water found at 1m depth, stabilized at 0.75m depth
- Only 15min to pump out the water (~63L)



Q10: Estimates of Costs (investment and personell)

In the Auger Upgrade we targeted at not exceeding ~ 20% of the original project costs of 50 MUSD (US counting scheme)
➙ escalated 2014 value: **~ 10-12 M€**

This includes (at least part of) prototyping and engineering

Nearly all of the materials, services and effort to implement the upgrade will be provided by in-kind contributions from the collaborating countries

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Sum
Funding Upg (M€)	0,0	0,5	4,0	4,0	2,5	0,5	0,0	0,0	0,0	0,0	0,0	11,5
Operation (M€)	1,4	1,4	1,5	1,5	1,5	1,6	1,6	1,6	1,6	1,6	1,6	16,9
Researchers	525	525	525	525	525	525	525	525	525	525	525	
Engineers (FTE)	1,5	4	4	4	1,5	0	0	0	0	0	0	15

Note: ≳ 60-70 % of these upgrade funds should be from EU partners (≳ 7-8 M€)
FTEs of Engineers are estimated from WBS-tables of upgrade
525 Collaborators include engineers for routine M&O

Fondi esterni: Status
EPLANET

CERN Document Server

EPLANET: the Europe-Latin America alliance for physics research and education

Twenty-nine partner institutions participate in EPLANET – the EU-funded project aimed at strengthening the links between the physics communities in Europe and Latin America. The project will help the Latin-American scientific community to reach and consolidate the critical scientific mass, and profit from the educational, technological and industrial impact of high-energy physics.

Auger inserito nel progetto. (WP9)
Referente Nazionale G. Matthiae
Referente Locale D. Martello

Risorse in corso di trasferimento
Durata del finanziamento 4 anni (2011-2014)

Progetti di ricerca scientifica e tecnologica bilaterale di "Grande Rilevanza" co-finanziati per l'anno 2011

Allegato IV

Progetti di Grande Rilevanza selezionati nel quadro del Programma Esecutivo di Cooperazione Scientifica e Tecnologica fra la Repubblica Italiana e la Repubblica Argentina per gli anni 2014-2016

Scienze di base (matematica, fisica, chimica, biologia e geologia)	Definizione di una soluzione tecnologica per lo studio della composizione dei Raggi Cosmici di Altissima Energia con l'Osservatorio Pierre Auger	Daniele Martello – Istituto Nazionale di Fisica Nucleare (INFN)	Alberto Etchegoyen Instituto de Tecnología de Detección y Astropartículas (CNEA, CONICET, UNSAM)

Nel settore della rivelazione dei raggi cosmici di altissima energia, l'osservatorio Pierre Auger è indiscusso primo.

Sezione 3. Risorse

Finanziarie

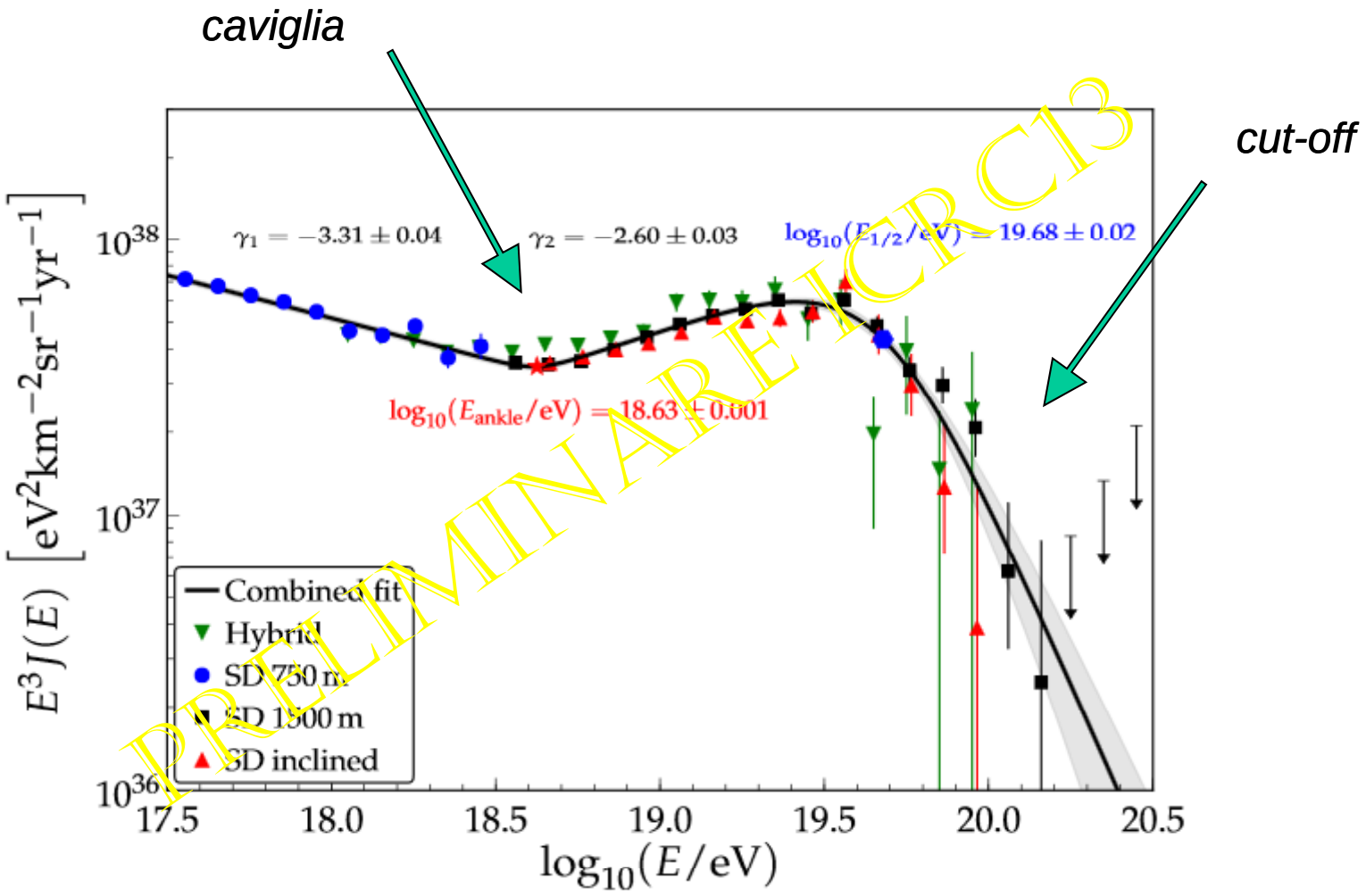
Indicare i costi **totali** (che includono i costi sostenuti da tutti i paesi partecipanti) per anno con le previsioni di costi dei prossimi anni, suddividendoli (ove pertinente) in costi di costruzione/upgrade/funzionamento, compilando la seguente tabella (esprimere i valori in migliaia di Euro):

Anno	Costi di costruzione		Costi per l'upgrade		Costi di funzionamento	
	Totale	***di cui Italia***	***Totale***	***di cui Italia***	***Totale***	***di cui Italia***
2014			500	50(*)	1600	200
2015			5000	500(*)	1760	220
2016			5000	500(*)	1940	240
2017			2000	200(*)	2100	270
2018			10000	1000(**)	2300	290
2019			5000	500(**)	2600	320
2020					2800	350

(*) *Upgrade proposto ai paesi finanziatori e in fase di valutazione. L'upgrade è mirato a migliorare la qualità della presa dati della IR allo scopo di determinare con maggior accuratezza la massa dei raggi cosmici primari.*

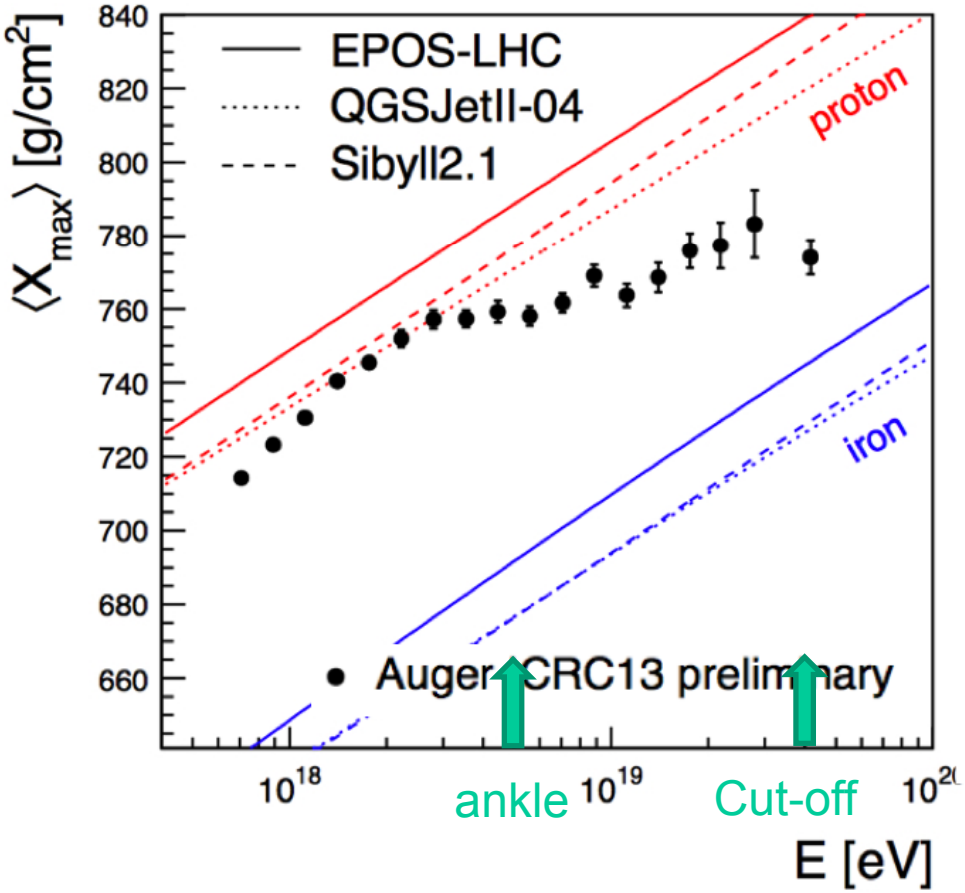
(**) *Questi costi sono destinati ad un potenziale upgrade delle attuali camere dei telescopi di fluorescenza basate su fotomoltiplicatori con camere basate su SiPM. Questo upgrade che permetterebbero di quadruplicare la presa dati con i rivelatori di fluorescenza è soggetto a possibili finanziamenti straordinari (MIUR e/o EU) per progetti inerenti a grandi infrastrutture di ricerca.*

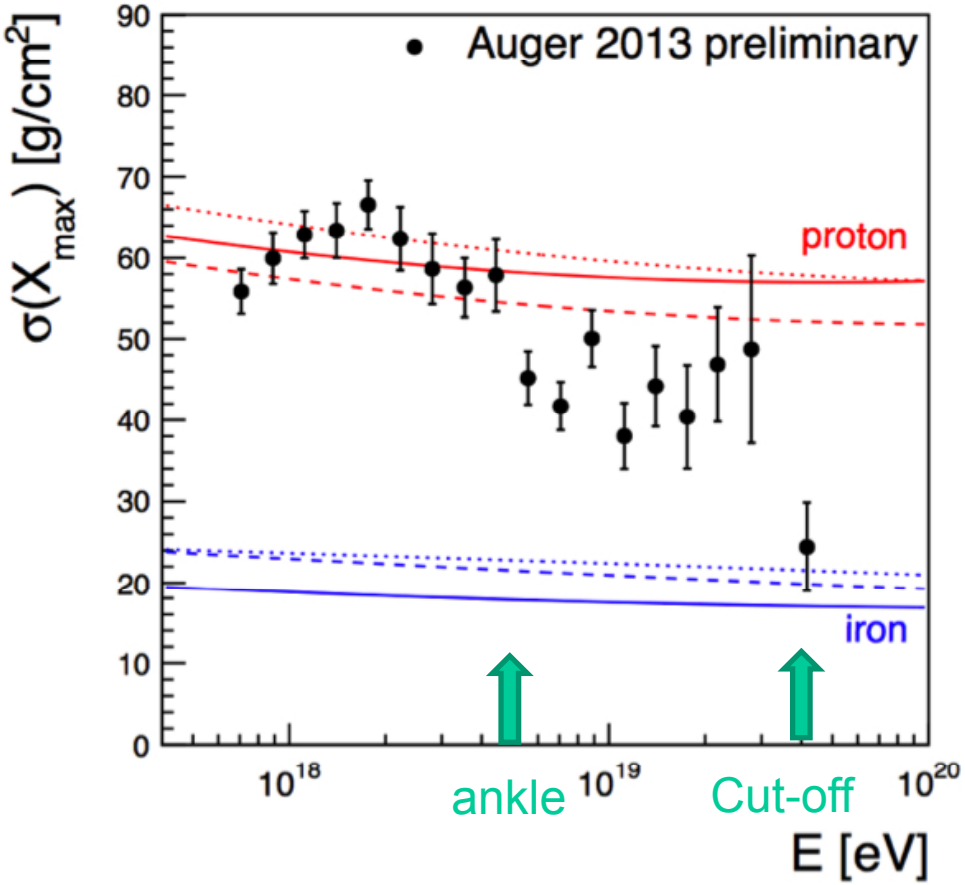
La parte più energetica dello Spettro dei Raggi Cosmici così come è misurata dall'Osservatorio Pierre Auger



Universalmente accettato che esiste un *cut-off* nel flusso dei Raggi Cosmici.
Universalmente accettato che esiste una *caviglia*.

Mass Composition



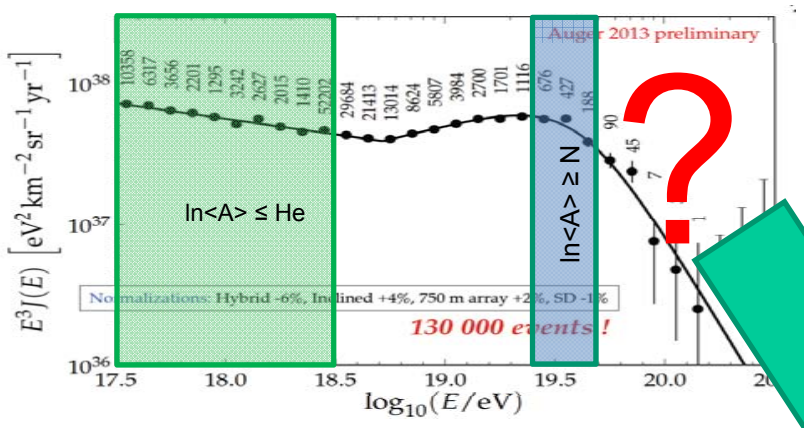


<X_{max} > became lower with energy

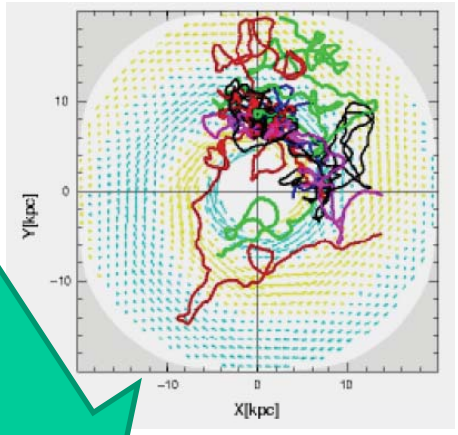
X_{max} distributions become narrower with energy

Increase of the mean mass with the energy? Inadequate interaction models?

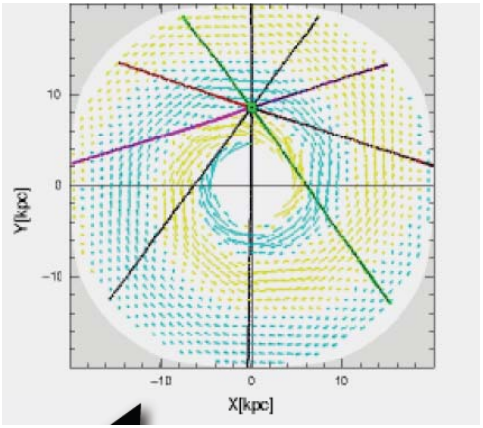
Anisotropy



Proton 10^{18} eV



Proton 10^{20} eV

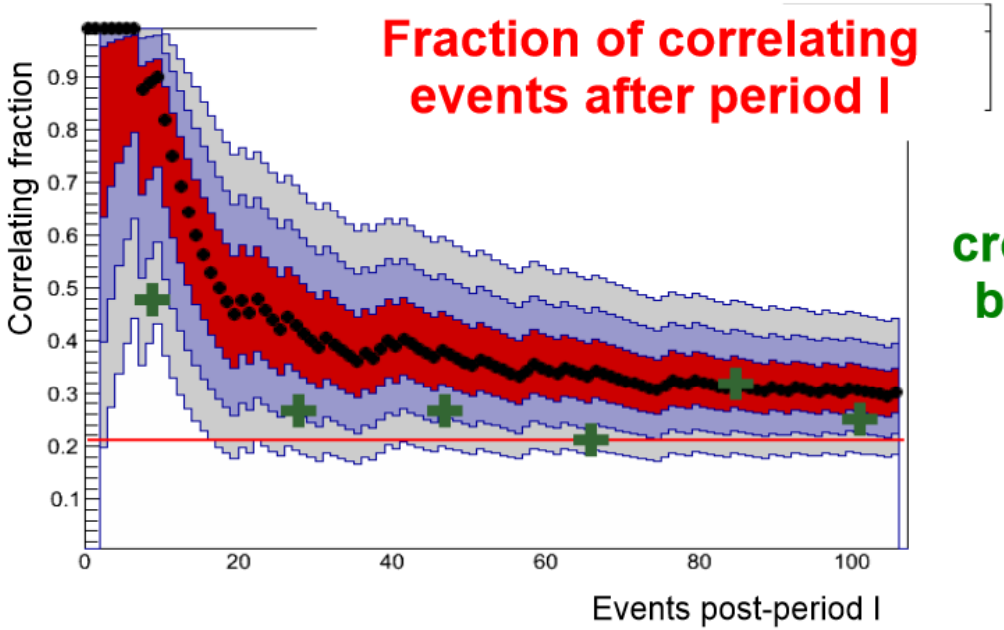


Deflessione P <3º ; Deflessione Fe 15º-20º

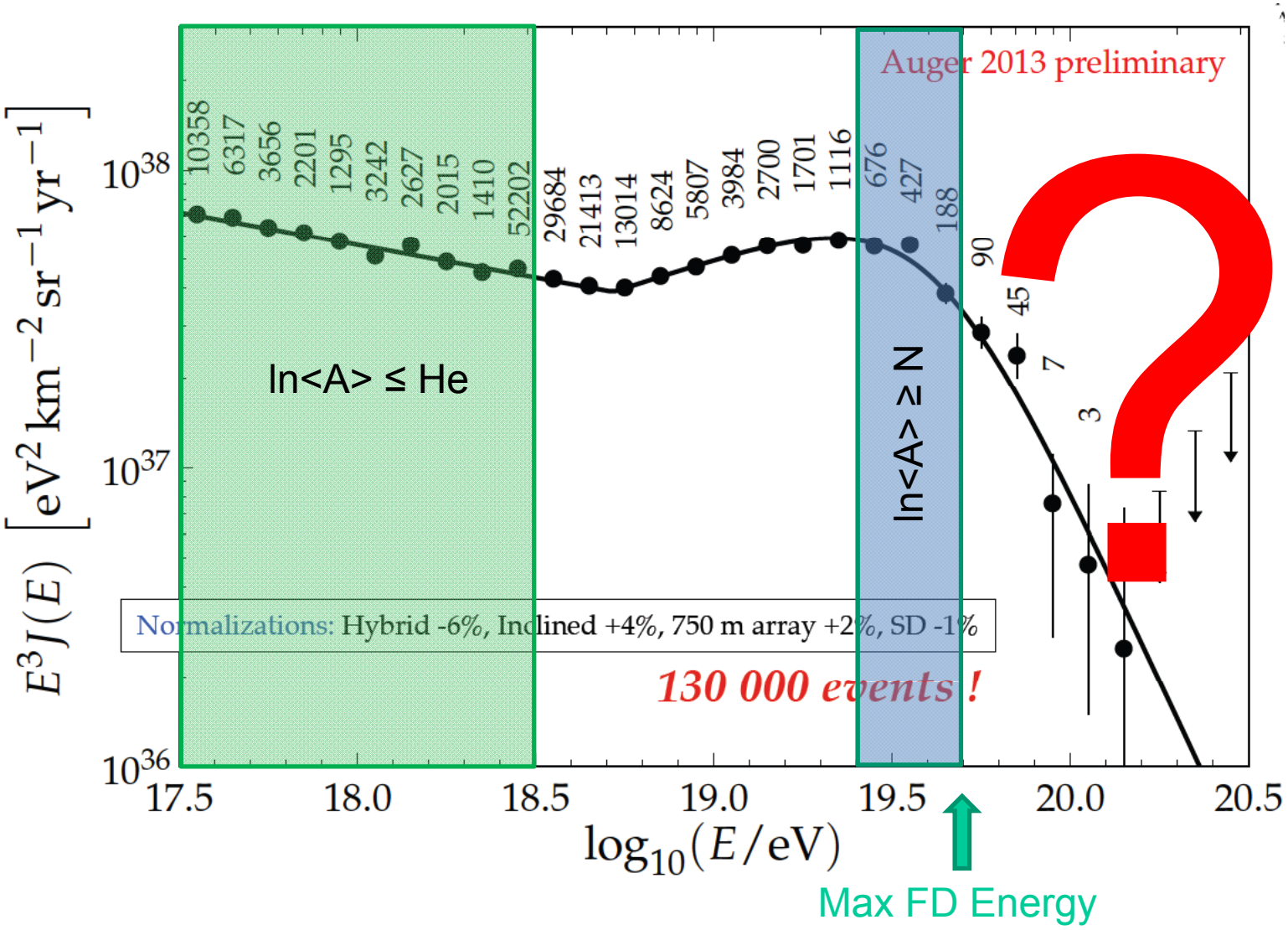
Eventi con energia maggiore di 54.8 EeV. Angolo di selezione 3.1º. Catalogo di riferimento VCV con z<0.018.

Poco compatibile con flusso isotropo.
TA fa affermazioni più forti!

1-2 sorgenti vicine + fondo isotropo?

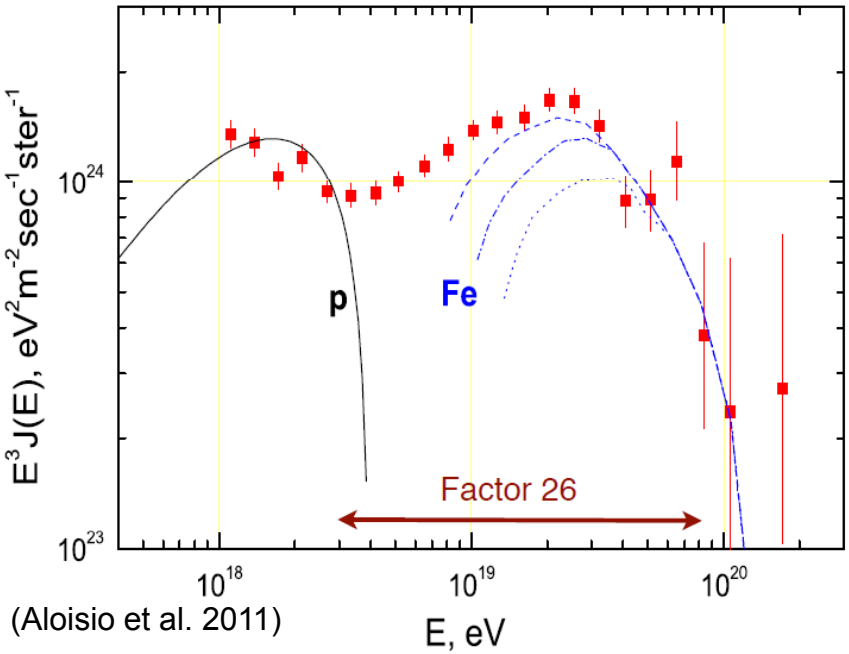


Mass Composition



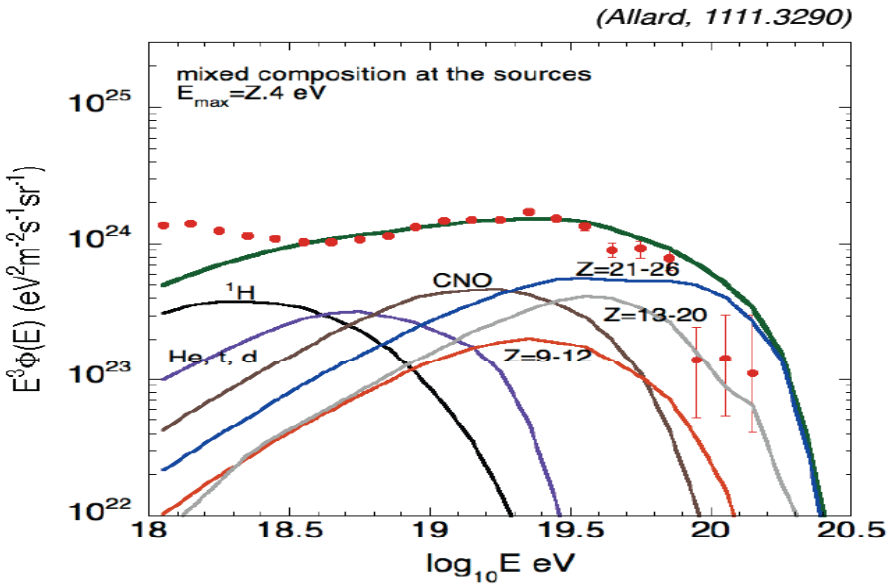
Cade il teorema Berenzisky?!? A cosa è dovuto il cut-off?
Incertezza dovuta ai modelli di interazione.

Modelli Interpretativi



(Aloisio et al. 2011)

- UHECR Rigidity dependent composition of Extragalactic origin
- GZK effect not needed
- Transition from galactic to extragalactic at lower energy (2nd knee)

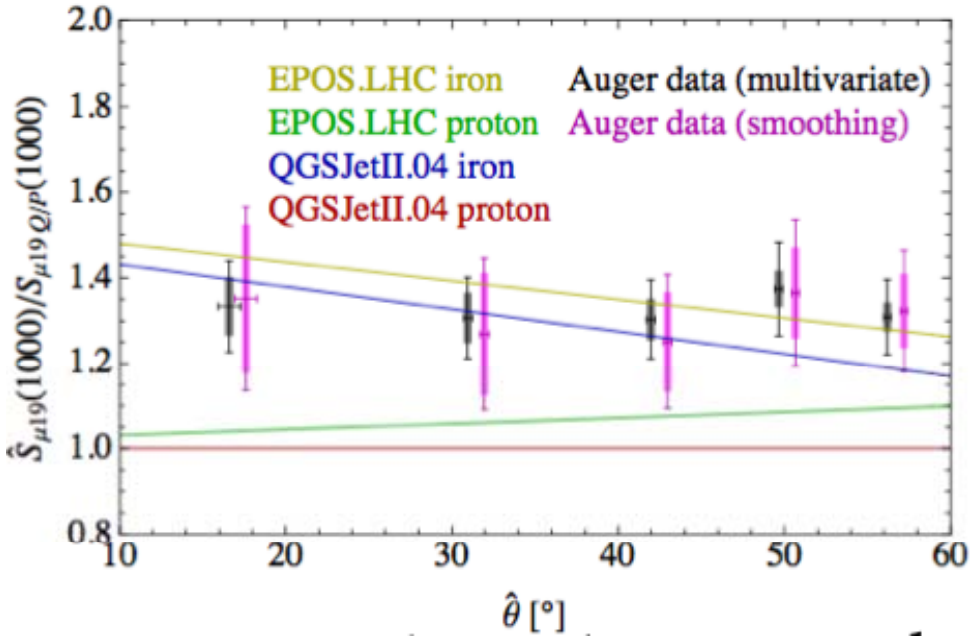


- UHECR Mixed composition at the sources (Extragalactic origin)
- GZK effect but for Heavy Elements
- Ankle due to transition between Galactic and Extragalactic spectrum.

Implicazioni!

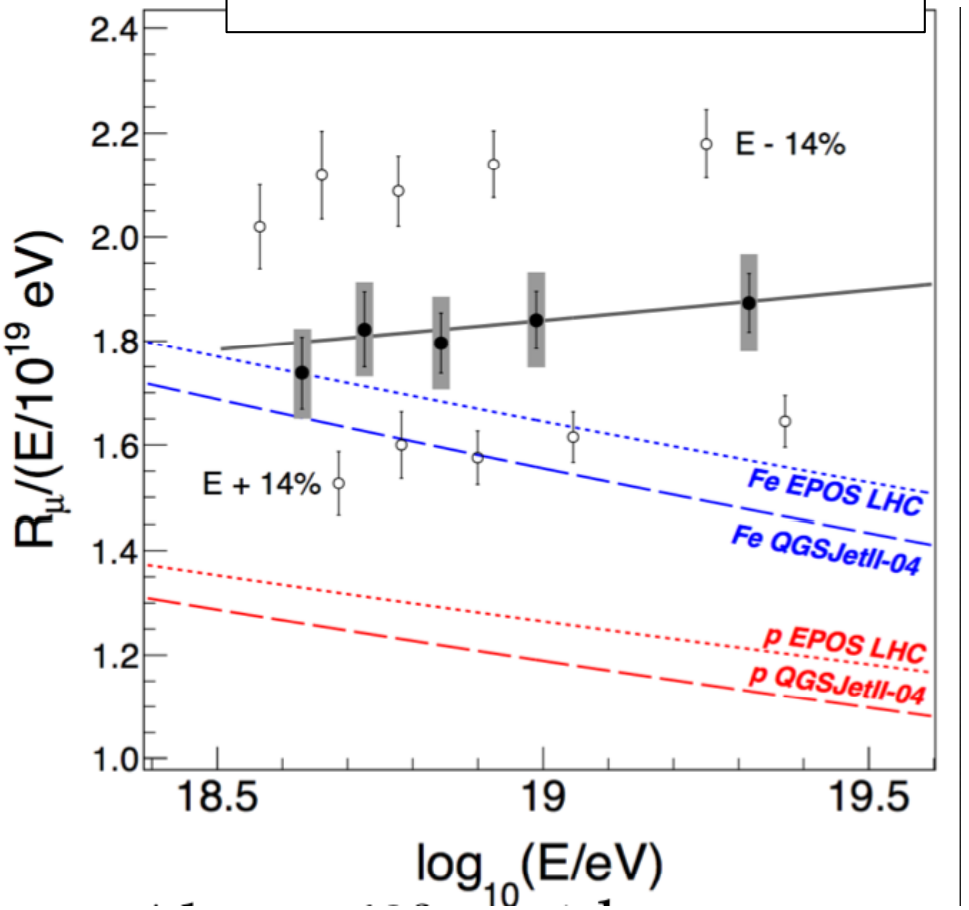
SD Mass Composition

From FADC traces @ 10 EeV



Tensione tra misure e attese Monte Carlo. Altri tipi di misure presentano contraddizioni anche più marcate.

Eventi Inclinati θ>60°



Negli eventi ad alto zenith segnale dominato da muoni.

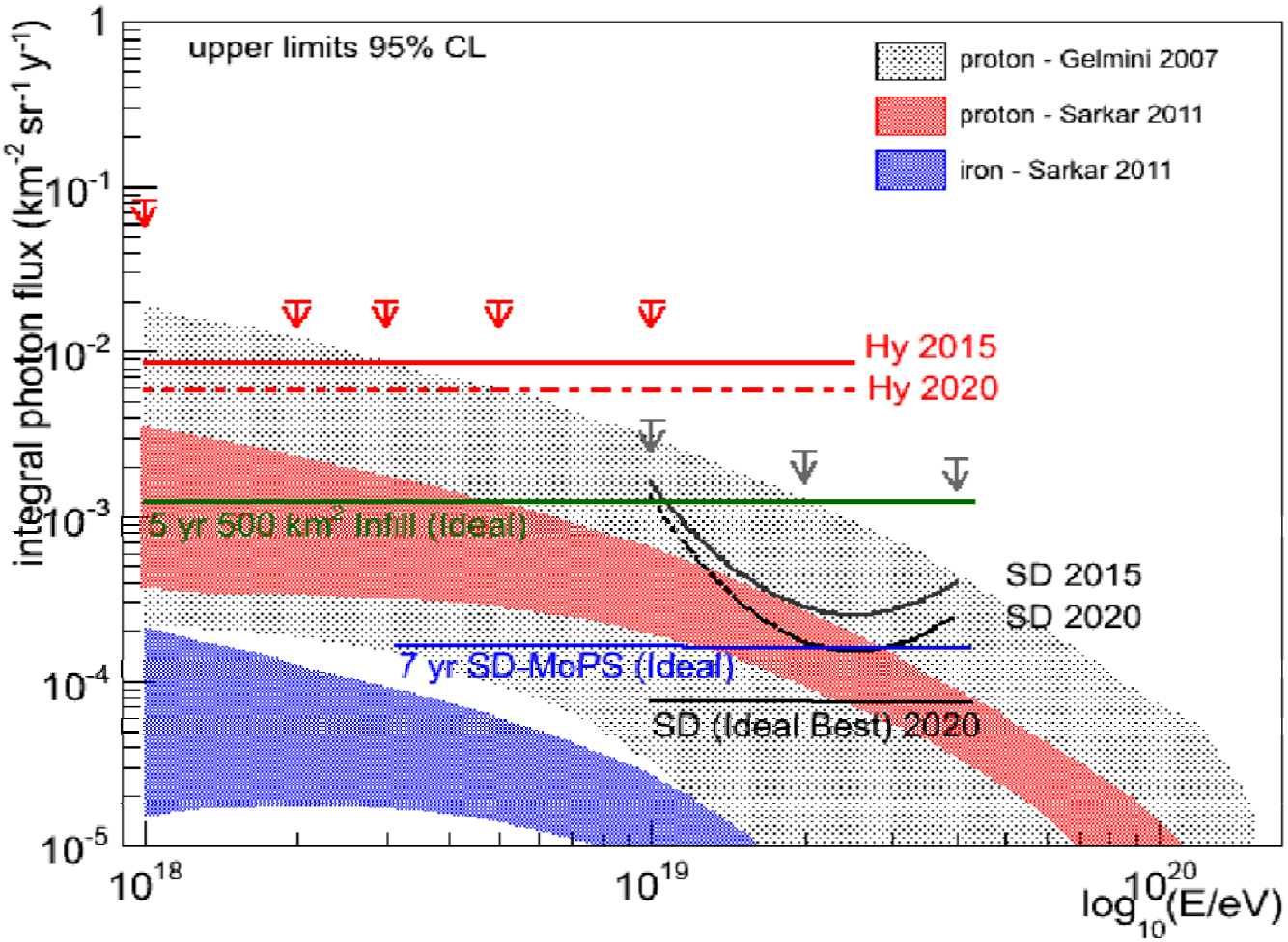
AUGER@CNAF

Il cluster Nazionale Auger attivo presso il CNAF costituisce il CE e SE di riferimento per i gruppi INFN.
Sul CE sono installati e aggiornati i programmi standard di simulazione e analisi della collaborazione. Il CE e parte dello SE fanno parte della griglia di produzione per le campagne di simulazione della collaborazione AUGER

Ci sono varie categorie di jobs:
-Produzione Corsika. Sviluppo di sciami raggi cosmici in atmosfera
-Offline a rivelatore ideale.
-Offline a rivelatore reale (accesso DB)-solo al CNAF o su farm dedicate.
Al 2014 - PLEDGE -> 2372 HS06 / Spazio Disco - 396 TB
PER il 2015 Richiesti in base al mod. calcolo:120 TB di Disco e 400 HS06 in termini di CPU

PRO – A parte il lavoro legato alla griglia di produzione assolutamente necessario, l'aver concentrato il nostro calcolo al CNAF ci ha permesso di avere un utilizzo CE/SE non confrontabile con le precedenti esperienze su farm locali. Inoltre alcuni tipi di produzioni/analisi (con DB) erano fortemente limitanti per i gruppi italiani.
CONTRO – L'utilizzo come “Centro di Calcolo” non e' sempre facile.
Abbiamo due code batch: auger e augerdb. La prima ha come carico maggiore di lavoro la produzione degli sciami in atmosfera che ha bisogno di pochissimo.
Sono jobs che girano su quasi tutte le CPU ad installazione quasi nulla.
Ci sono poi dei jobs di simulazione del rivelatore "ideale" e cioe' senza accesso
ai DB che sono anche questi abbastanza tranquilli. Un discorso a parte va fatto per la coda augerdb. Questa si e' basata finora e si basa sulla
infrastruttura WNODES (specifica del CNAF).
Da parte nostra questo tipo di coda e' necessaria in corrispondenza di una produzione di spettro ibrido, che di fatto non viene fatta continuamente. Da parte del CNAF, mentre nei primi periodi della nostra implementazione anche i ``giganti'' (LHC-exp) erano su wnodes, ora di fatto non e' piu' cosi' e quindi un problema su wnodes e' un problema quasi esclusivamente auger. Diciamo che dopo l'ultima produzione siamo un po' perplessi sull' utilizzo di questa ``soluzione''.

Future of diffuse photon searches



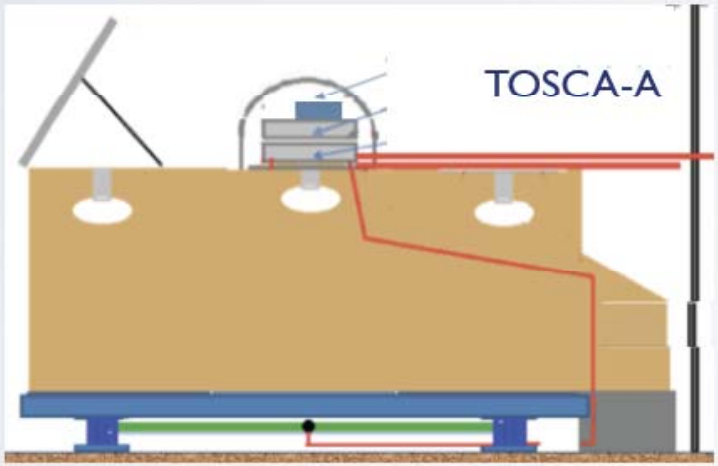
→ Ideal case: no background contamination, 50% photon efficiency

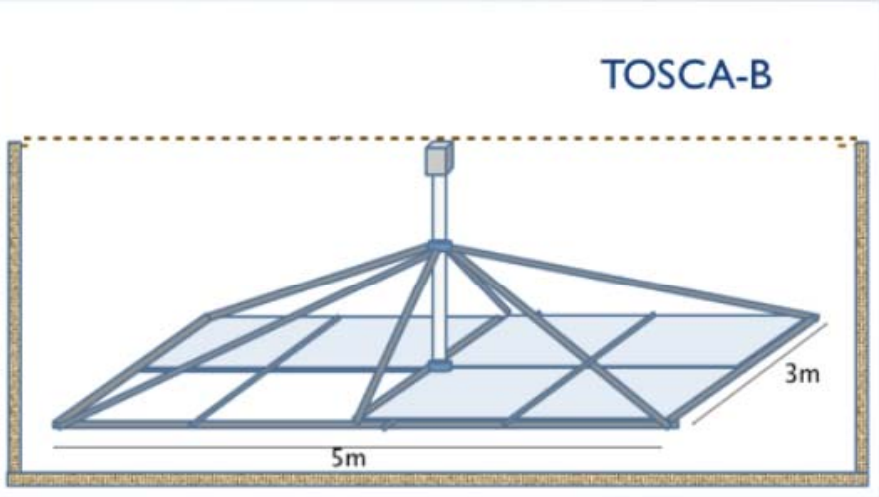
→ Goals: approach the ideal case improving the analysis, extend the SD search to lower energies where the cosmogenic photon flux is higher.

C. Bleve

TWO DESIGNS

- *spring 2013* : Torino proposal to build 10 m^2 scintillator detectors to be buried underground (MuScint - GAP2013-050, similar to TOSCA-B)
- *June 2013*: at the Lisbon meeting, request to find a compromise solution
- *September 2013*: collaboration among 5 Italian groups (TO,LE,NA,MI,CT) to build 4 m^2 scintillators to be located under the WCD: TOSCA-A





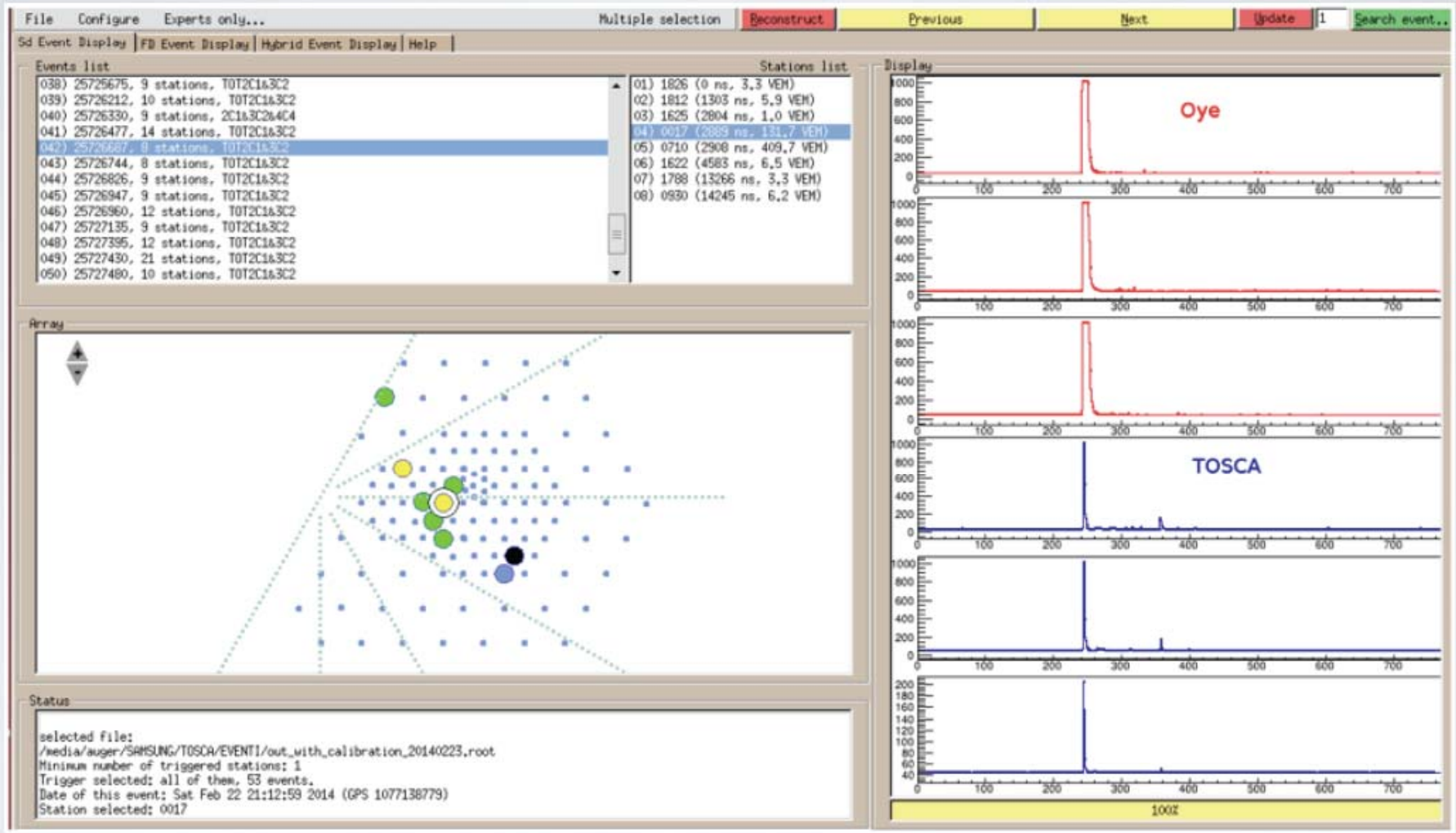
- Area : 4 m^2 (to be shielded by the WCD)
- Shielding : 120 cm H_2O + 20 cm concrete
- Construction : WCD lifted on top a concrete bench below which the scintillator is located

- Area : ~10 m^2
- Shielding : ~130-150 cm soil
- Construction : buried in a hole aside the WCD

TOSCA IN THE FIELD

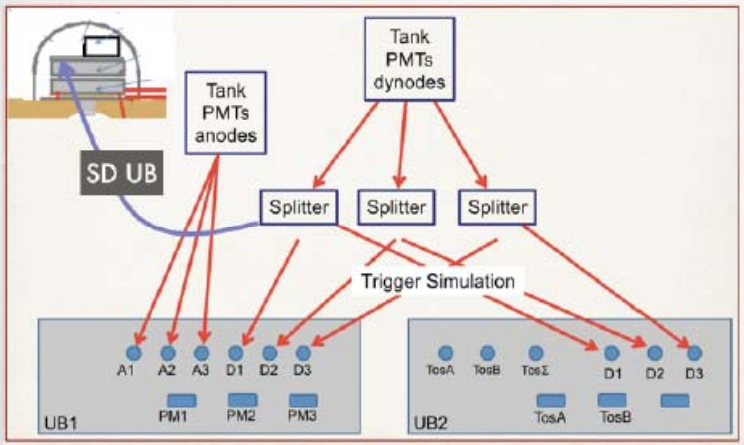
Oye - a standard SD tank in the Triplete region; near
Tierra del Fuego (additional, BATATA)
Corrientes (AMIGA UC+muons)

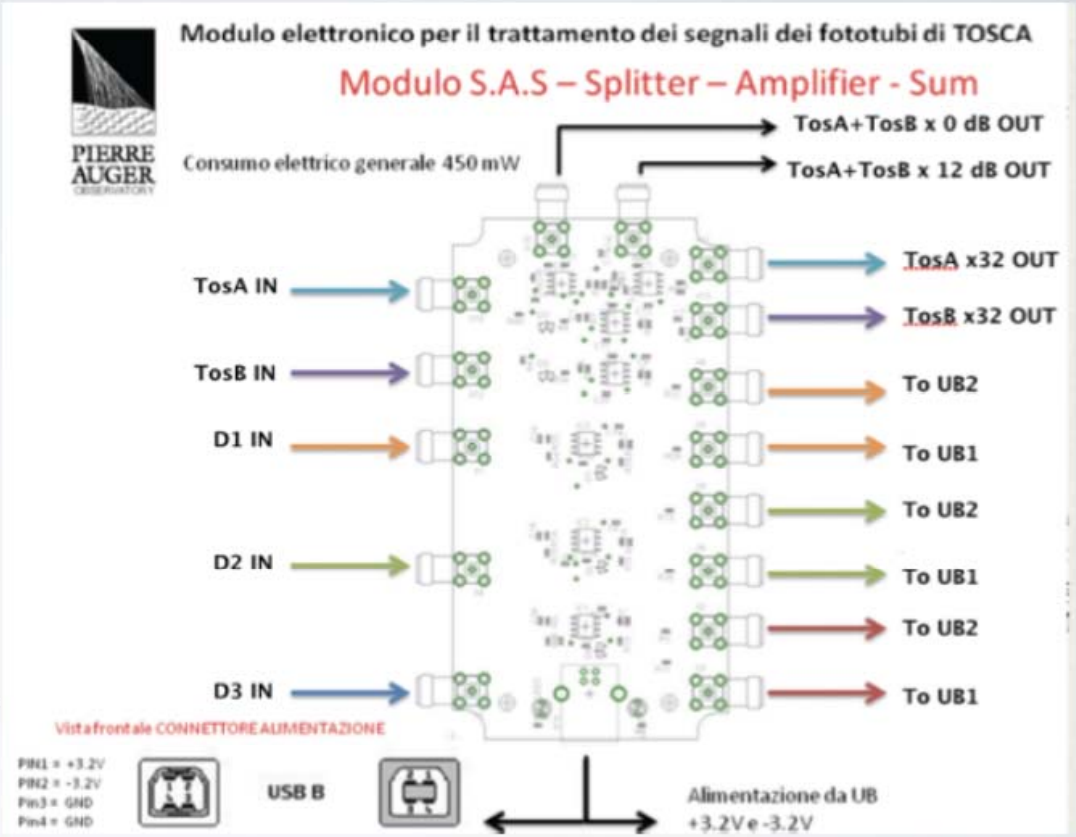
REAL EVENTS - EXAMPLES



TOSCA ACQUISITION

S.A.S card - INFN Lecce





Scintillator Brainstorming Meeting

Scintillator Brainstorming Meeting

chaired by Daniele Martello, Federico Sanchez, Markus Roth

from Tuesday 20 May 2014 at **12:00** to Thursday 22 May 2014 at **12:30** (Europe/Berlin)
at KIT CN, 425 (206)

Description **Aim of the meeting**

The main goal of the brainstorming, following the indication of the SAC, will be compare the upgrade proposals based on the use of Scintillator Detectors and evaluate how merge the different projects in a common proposal.

Hotel

Participants are asked to get in contact with the organizers to book a hotel room. They will make a booking for you (at Hotel Greif). We will of bus transport from and to the venue.

If you book a room by yourself then you need also to take care of transport by yourself.

Organizers

Sabine Bucher <sabine.bucherATkit.edu>

Daniele Martello <daniele.martelloATle.infn.it>

Markus Roth <markus.roth2ATkit.edu>

Federico Sanchez <federico.sanchezATiteda.cnea.gov.ar>