





Engineering and Infrastructures

Borrow from Otger Ballester / Laia Cardiel





Infrastructures



Infrastructures: clean room

- Fully operative
- Main uses:
 - Sensor manipulation/setup installation: CCDs, APDs, Pixels
 - Xray Microelectronics
 - PAUCam assembly
- New:
 - Air, N2, vacuum
 - Wire-bonding
 - Solder bump deposition





Infrastructures: others

- CNC Milling machine
 - 1300x800x800mm
 - 24 Tools
- Vacuum oven:
 - Electronic boards and mechanical small parts bakeout
- Stereo Inspection Microscope
- XYTable dedicated PLC









Engineering



• Physics projects offer many and diverse engineering opportunities

- Main lines of interest
 - Front End and Readout Electronics
 - Control Systems
 - Detectors (Design and Operation)
 - Precise movements
 - Cryogenics
 - Vacuum













- Challenging designs for electronic engineers
- Provides Visibility
- We already have experts











PAUCam Control System

- Complete control system:
 - TCSi, DAQi, QA, Guider, SCi, Scheduler, GUI
- Distributed system based on message distribution
 - Central Node + Satellites

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|----------------------|--|--------------|-------------------------|-------------|-------|--------|-------|--------|
| | | | 30 | verriperatu | | | | |
| XYTableControl - [| Power] 😰 🍃 🔀 🛛 👁 🕸 🚳 | 🚸 : 🔮 : | 24 | | | | | |
| | | Disconnect | 20 - | | | | | - |
| nagement | TEMPERATURE SENSOR 0 | | 18 | | | | | |
| Register Access | Alarm (Temp <min. td="" temp)<=""><td>False</td><td></td><td>6.25</td><td>m</td><td>4.59m</td><td>2.92m</td><td>75.14s</td></min.> | False | | 6.25 | m | 4.59m | 2.92m | 75.14s |
| | Alarm (Temp>Max. Temp) | False | 13.51 seconds | | | | | |
| Atamis configuration | Current temperature | 0.0 | | | | | | |
| | | | | | | | | |
| | Minimum temperature | 0 | | SET | | | | |
| | Acknowledge alarm | 50 | ACK | SET | | | | |
| | Alarm status | Enable | | isable | 1.0 | | | |
| | | | | | | | | |
| | TEMPERATURE SENSOR 1 | | | | | | | |
| | Alarm (Temp. <min. td="" temp)<=""><td>False</td><td></td><td></td><td></td><td></td><td></td><td></td></min.> | False | | | | | | |
| | Alarm (Temp.>Max. Temp) | False | | | | | | |
| | Current temperature | 19.7999877 | 93 | | | | | E |
| | Minimum temperature | 0.0 | | SET | | | | |
| | Maximum temperature | 25.0 | | SET | | | | |
| | Acknowledge alarm | | ACK | | | | | |
| | Alarm status | Enable | e C | isable | 0.0 | | | |
| | GE | T VALUES FRO | OM PLC | | | | | J |
| ovements | | | | | | | | C |

Temperature sensor readout (degrees) : S chart



| Id: 0 | Name | Value |
|--------------------------------|-------------|--|
| | description | Long description of this run When it will be executed and why What is the awesome physics results you expe which surely will grant you the nobel prize blah, blah, blah |
| Type: Blas | ▶ misc | |
| ld: 1 | instrumen | t PAUCam |
| Cont (Cont (Cont) | creation-d | ate 2012-11-08 |
| | aucnors | |
| Type: Bias | telescope | ING WHT |
| Cont (kod) (kud) Type: Blas | | |
| Type: Dark | | |
| ld: 4 | | Properties |
| 000 | name | Acquisition |
| Type: Dark | status | pending |
| ld: 5 | description | None |
| Ford faced found | startedon | None |
| | results | 0 |
| Type: Flat | id | - 8a5d219a-2d18-415d-b961-995357b05d76 |
| ld: 6 | updates | 1 |
| | errors | |
| | petid | - None |
| | endon | None |
| Type: Flat | | |



Detectors:

- Fundamental piece of any project
- Challenging

Design and production:

- Single Pixel Analog Front-End ASIC for PET applications
- 16 «smart» pixels 2D array readout electronics for PET applications



Detectors test and Characterization

PAU CCD Characterization





Magic Si PM test





Precise Movements

XYTable PAUCam Filter Tray System PAUCam Shutter















Physics

Borrow from Otger Ballester / Laia Cardiel







Physics



• IFAE research lines

Experimental Division

- Hadron Colliders
- Neutrinos
- Gamma-ray astrophysics
- Medical Physics
- Observational Cosmology

Theory Division

- Standard Model
- Beyond Standard Model
- Astroparticles and Cosmology

Gamma-ray astrophysics group (>10 years exploiting MAGIC):

- Galactic objects: PWNe, binaries
- AGN \rightarrow EBL, LIV, ALP
- Fundamental Physics: dark matter, electron-positron spectra
- Also background expertise on particle physics and cosmic rays



- Infrastructure and Machines
 - Clean and Shielded room
 - Quite complete mechanical workshop
- Engineering expertise
 - Front end electronics (analogue and digital, fast signal)
 - Hardware control
 - ASIC development
 - Mechanics for precise movements
 - Detector mechanics: vacuum, cryogenics
 - Hardware test and characterization
- Physics background
 - Gamma-ray astrophysics (galactic, AGNs, fundamental physics)
 - Background from "past": particle physics, cosmic rays



Thanks for your attention!



- PAUCam CCD preamplifier
 - Gold plated, low outgassing components for Vacuum
 - Diferential
 - For low noise system (<6e)
 - Low power consumption (100mW)





VIP

- Nuclear imaging
 - Rigiflex
 - 8 Sensor CDTe + signal conditioning
 - Control
- Sensor PCB pileup: Up to 10 -> 80Sensors





CTA

- SumTrigger boards new design with delay lines
 - 8 channels
- Characterization and calibration of sum trigger test boards





Control systems:

- Interesting and useful
- Mechanics, electronics and software

CTA LIDAR

- XY laser alignment
- Container motors control
- Web interface + API

| | IFAE Enginieering Se |
|--------------------------|--|
| verview | Motor utility |
| open/close door | |
| lotor position | Doors: STOP OPEN CLOSE |
| Configuration Vetwork | Petals: STOP OPEN CLOSE |
| SNMP configuration | Variable: STOP OPEN CLOSE |
| HALT! | Door status Right: Close:• Open: • |
| | Petal: Close: Open: Variable: Close: Open: |



Cher developments









PAUCam Slow Control

- Motion Control
- Software
- Integration into PAUCam CS







Cher developments







