

# Status of the ATLAS Spanish TIER-2. View from a Federated TIER-2

COORDINATED PROJECT  
IN THE SPANISH H.E.P. PROGRAM: UAM (Madrid), IFAE (Barcelona) and  
IFIC (Valencia)



Presented by : **José SALT (IFIC PL)**  
**25th September 2006**

**UAM PL: José del Peso**  
**IFAE PL: Andreu Pacheco**

**LHCC Comprehensive Review**  
**CERN**

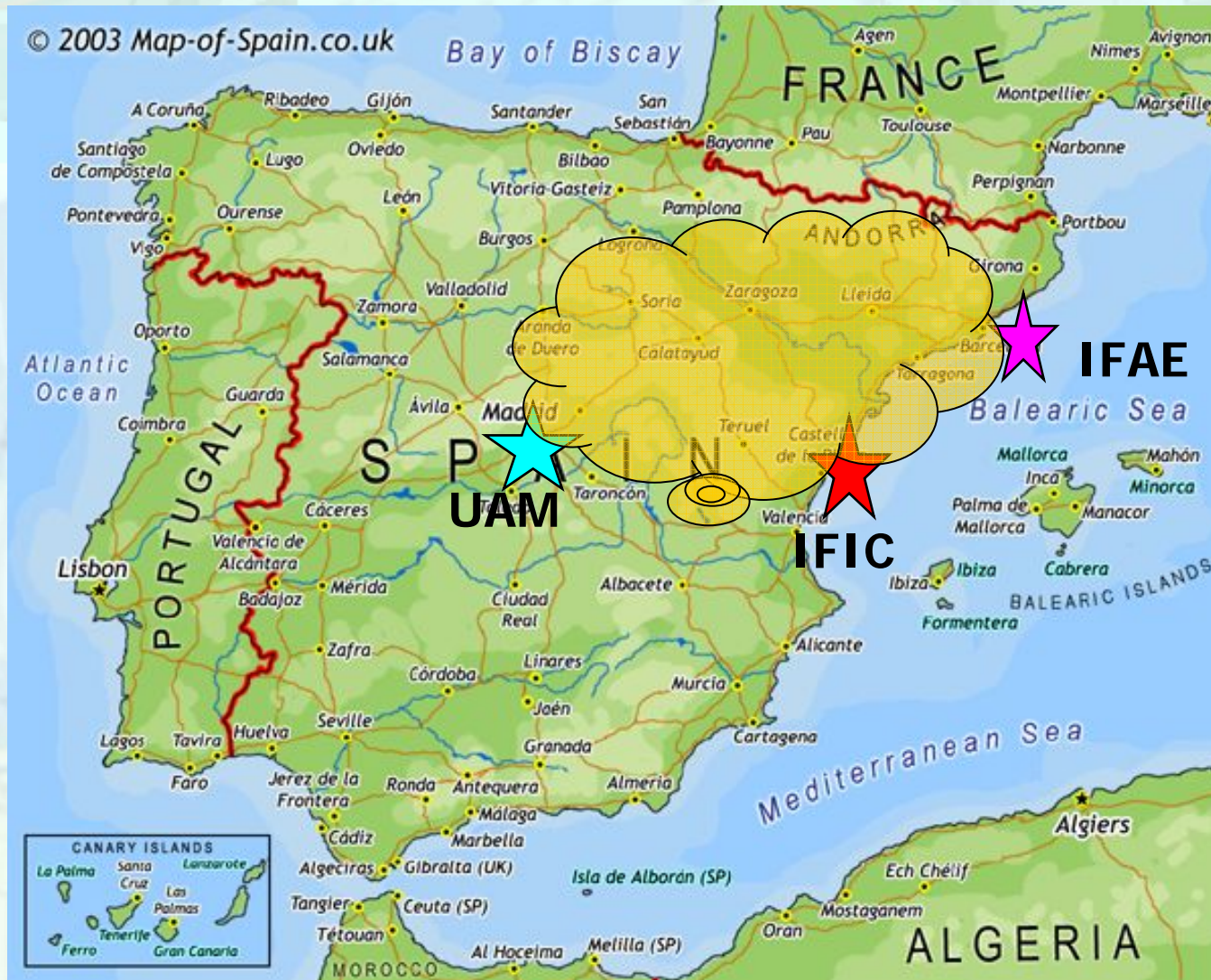
**(PL = Project Leader)**

# **OUTLINE**

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- 1.- Description of the ATLAS TIER-2**
- 2.- Activities performed at Tier-2**
- 3.- Conclusions and Comments**

# 1. Description of the Spanish ATLAS TIER-2

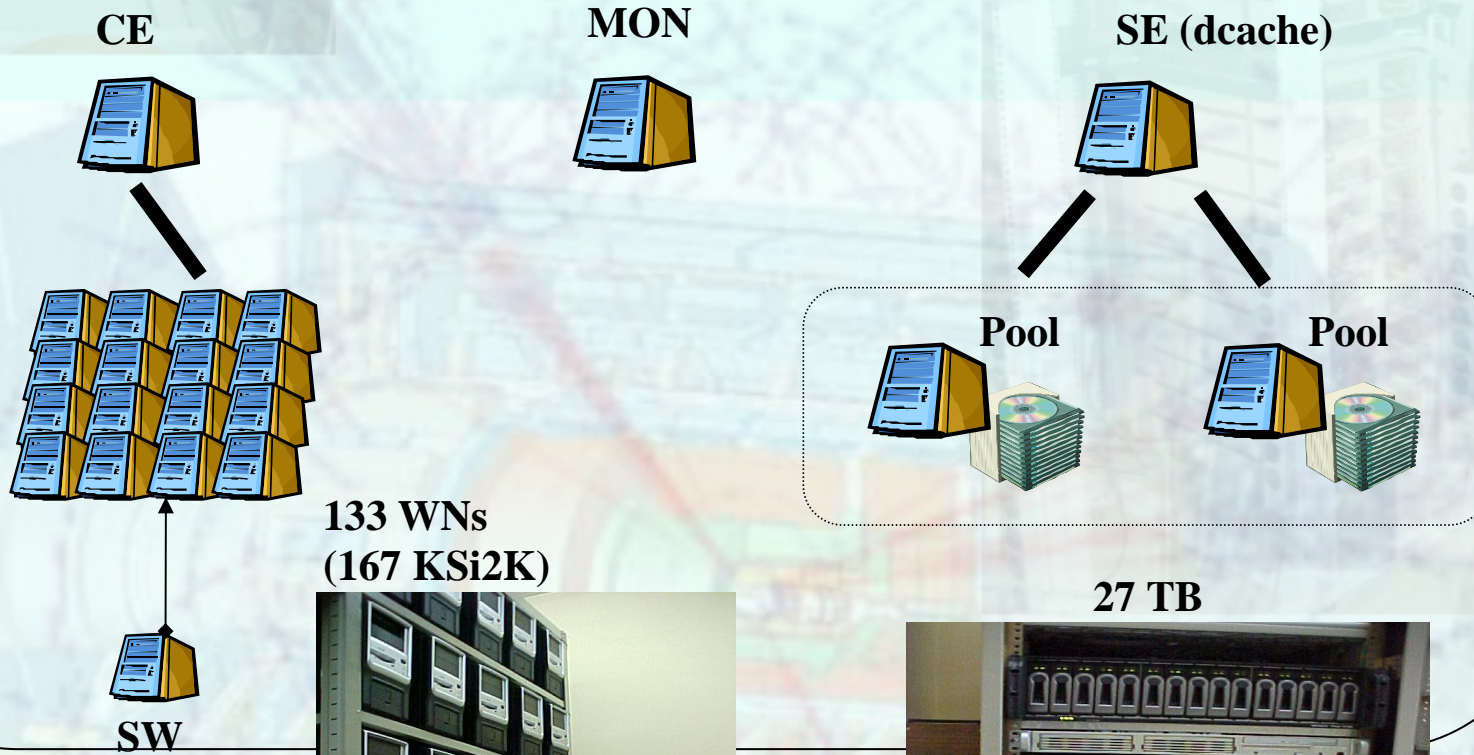


# Involvement of Spain in ATLAS.

**ATLAS Physics NOW, it will be enlarged by  
The time the LHC starts**

- **UAM:**
  - **Construction of the ATLAS Electromagnetic Calorimeter**
  - **ATLAS Physics: MC studies on Higgs production using 2 decays modes: 2 gammas and 4 leptons**
- **IFIC:**
  - **Construction of the ATLAS Hadronic Calorimeter (TileCal)**
  - **Construction of the ATLAS SCT-Fwd**
  - **ATLAS Physics: b tagging algorithms for event selection; MC studies of different process beyond SM ( Little Higgs and Extra Dimensions models)**
- **IFAE:**
  - **Construction and Commissioning of ATLAS Hadronic Calorimeter (TileCal)**
  - **Development and Deployment of the ATLAS third level trigger (Event Filter Farm)**
  - **ATLAS Physics: TileCal Calibration, Reconstruction and Calibration of Jet/Tau/Missing Transverse Energy, neutral and charged Higgs Search)**

# UAM

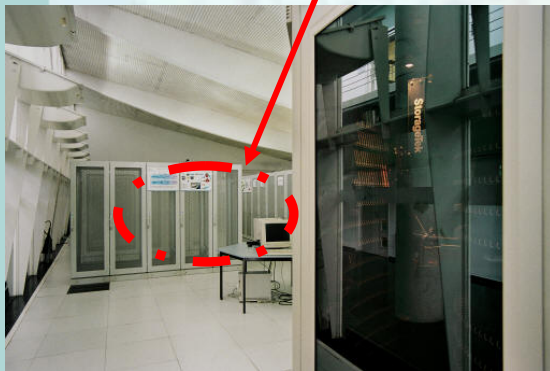


# IFAE



•The computer nodes and the disks will be hosted in racks at the PIC Computer room.

•Location reserved for the Atlas Tier-2



- Protected power with UPS 220 kVA
- Diesel Power Generator 500 kVA
- Castor Robotic storage
- Internal and external Gigabit Ethernet infrastructure



- 16 servers WN Batch (29'2 KSI2K)
- 3 servers for services (10,2 KSI2k)
- Data Disk: 4'35 TB
- User Disk : 2'1 TB

# IFIC

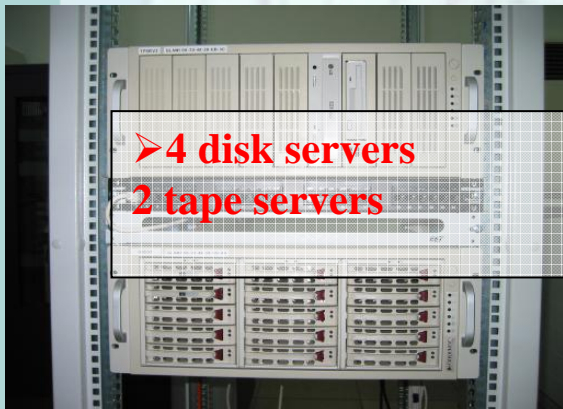


➤ Robot STK L700e700  
Up to 134 TB capacity

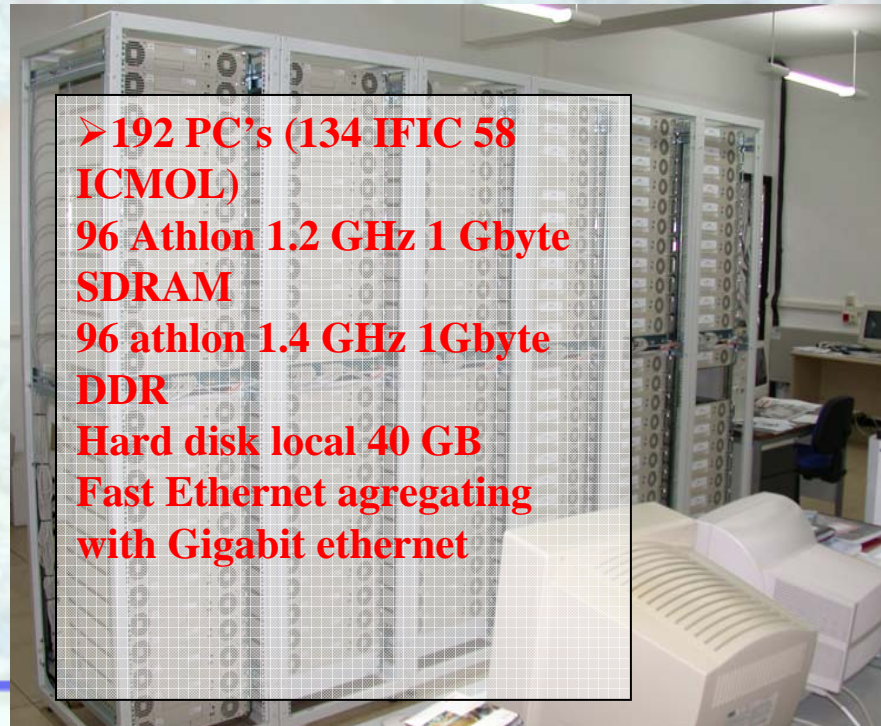
**CPU = around  
180 KSI2k  
Disk= 10TB**



**New acquisition:**  
-30 nodes PE850  
-Processor  
Pentium  
D 840 @ 3.2 Ghz  
- 2 GB DDR  
- 160 GB HD  
- 2 interface Gigabit



➤ 4 disk servers  
2 tape servers



➤ 192 PC's (134 IFIC 58  
ICMOL)  
96 Athlon 1.2 GHz 1 Gbyte  
SDRAM  
96 athlon 1.4 GHz 1Gbyte  
DDR  
Hard disk local 40 GB  
Fast Ethernet agregating  
with Gigabit ethernet

# Human resources of the Spanish ATLAS TIER-2

- **UAM:**

**Total FTE = 14 FTEs**

- José del Peso (*PL*)
- Juanjo Pardo
- Jorge Izquierdo
- Mattias Peez

**3 FTE**

- **IFAE:**

- Andreu Pacheco (*PL*)
- Xavier Espinal
- Mireia Dosil
- Jordi Nadal
- Hego Garaitogandia

**4 FTE**

- **IFIC**

- José Salt (*PL and Coordinator*)
- Javier Sánchez (*Tier-2 Operation Coordination*)
- Mohammed Kaci
- Luis March
- Farida Fassi
- Alejandro Lamas
- Alvaro Fernández
- Eduardo Ros

**7 FTE**



# Added Value of the other GRID projects

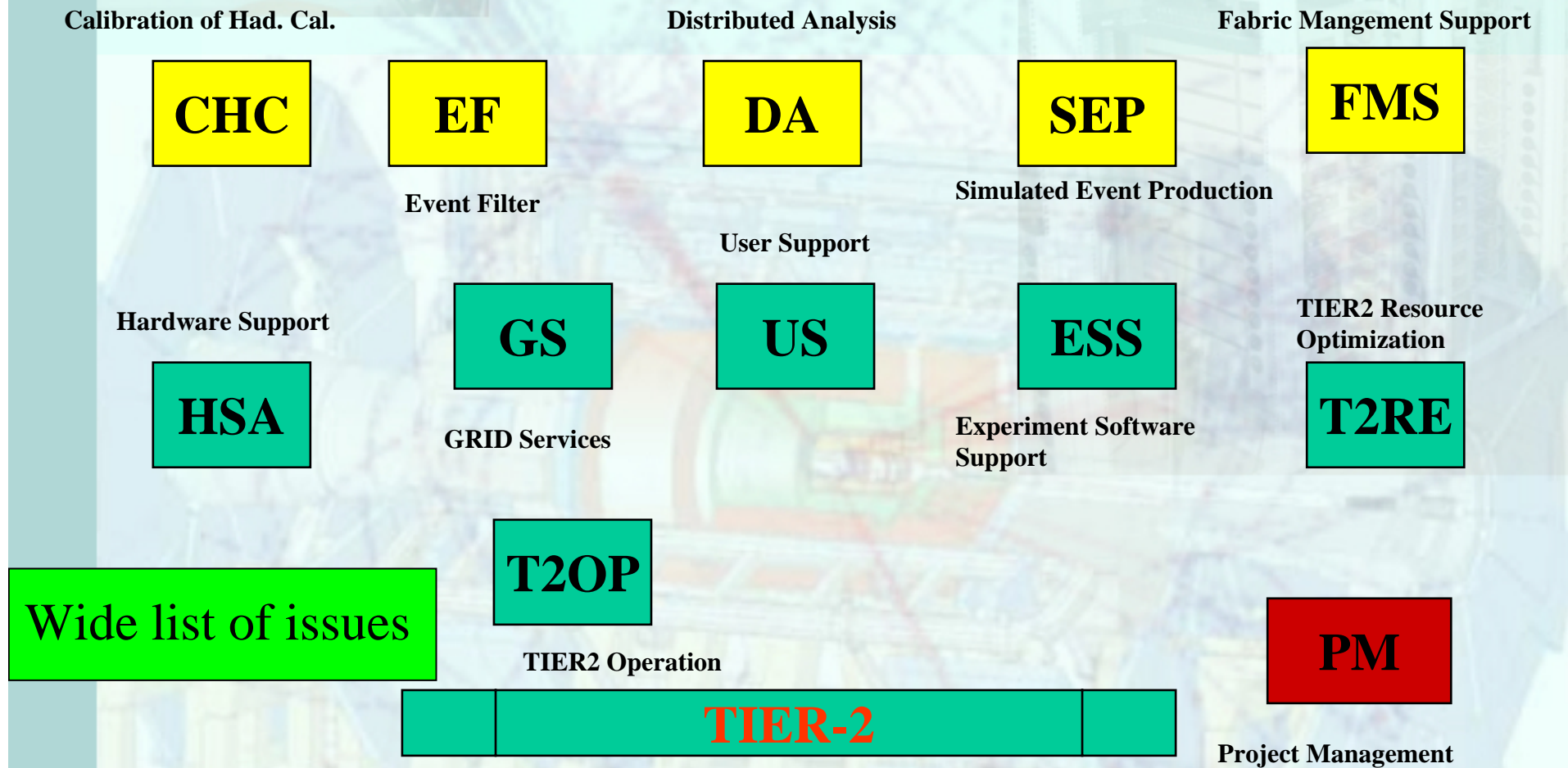
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- **Participation in EU GRID Projects: DATAGRID (2001-2004), CROSSGRID (2002-2005) , EGEE (2004-2006) have been very useful for the development of GRID technologies**
- **EGEE and LCG (LHC Computing GRID) projects are strongly coupled and they provide complementary visions of a given problem**
- **HEP groups have a leadership role in several GRID and e-Science initiatives ( in particular at national and autonomous levels)**

**EGEE = Enabling GRID Computing for E-Science in Europe (Elsewhere)**

# 2. Activities at the ATLAS TIER-2

(as it was presented to the HEP Commission)

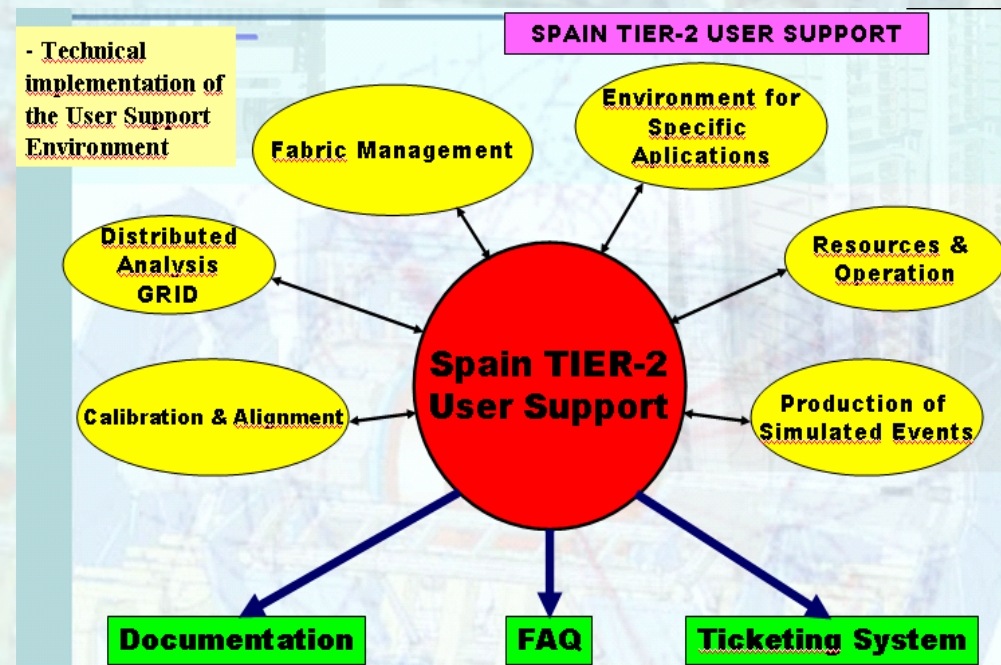




- **Responsible of the Overall Coordination of TIER-2**
- **Design and development of the technical specification and policies to ensure the distributed TIER-2 will be seen as an unique virtual TiER-2**
- **Technical link with the TIER-1's Constellation**
- **Coordination :**
  - **Processing and storage resources in order to achieve an efficient and optimal operation of individual centers (fault-tolerance, response speed, etc)**
  - **Global policies of security and access**
  - **Establishment of global monitoring tools and policies to obtain usage metrics, estability of TIER-2**
  - **Usage statistics and QoS to the responsables of the project**

## TIER-2 User Support

- **Synergy with EGEE project:** IFIC is responsible of the HELPDESK ROC-SWE (South-West federation of EGEE project, hosted by CSIC-IFIC):
  - Receiving 5-10 tickets/week
  - As helpdesk we give support for (=expertise groups):
    - **Basic infrastructure, testbed/preproduction. Gris Services, MW deployment, Monitoring, User support, CA, VO**
- **Helpdesk** is working and in particular it can be used as Tier-2 Helpdesk. To be used by 'Power Users' ( personnel of TIER-2 & TIER-3)
- **Courses for GRID Services**
- It remains to establish the **Internal User support** ( Analysis Physicists = Tier-2 end-users)



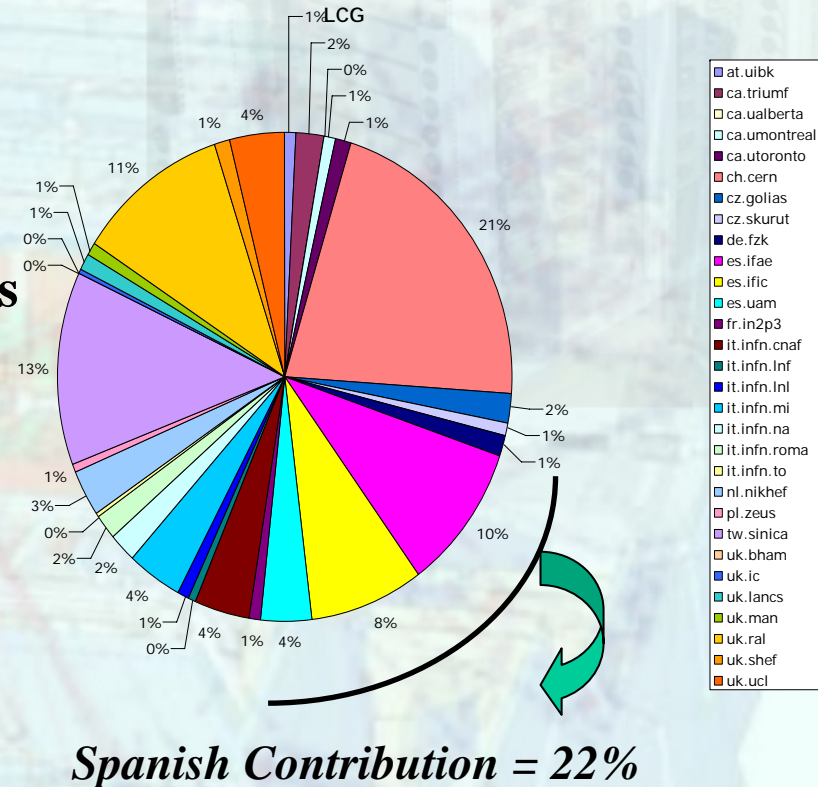
**As the configuration of different clusters in a GRID is correlated, a mistake may affect the correct operation of the whole GRID. A tool for automatic installation and configuration has been developed: QUATTOR**

**UAM Group** has played a pivotal role goal of the activity: maintain the high performance standards of QUATTOR, mandatory for the reliable operation of the GRID

**Work needed:**

- a) further development of QUATTOR for a correct operation of the GRID on the final ATLAS TIER-2**
- b) to give support to the TIER-2 and other sites in what QUATTOR administration is concerned**

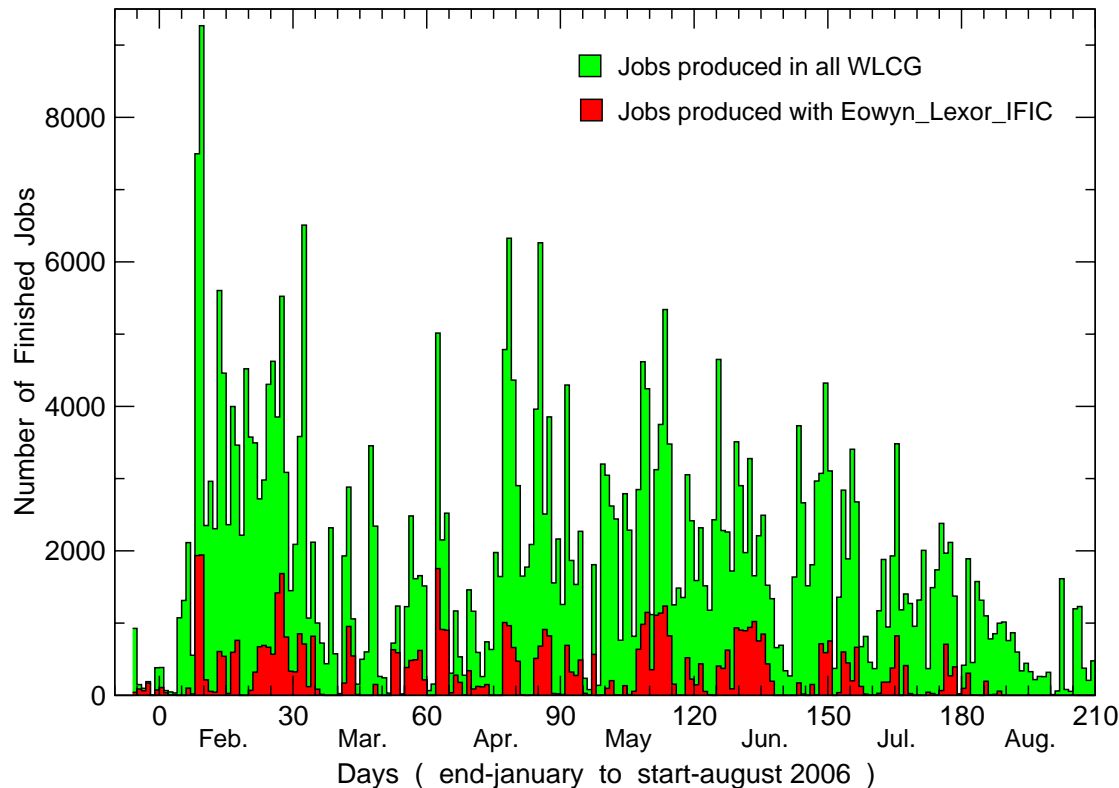
- **Main objective.** To validate the computing Model by performing the so-called Data Challenges/Service Challenges for the Production of MC events.
- **Involvement: participation in DC1, DC2, DC3 and CSC of ATLAS (2002-2006) :**
  - In DC2, first time the exercise was done using the GRID features;
  - IFIC has contributed with resources (RB, BDII, proxy server) and running LEXOR (executor) instances
  - Participation in the Rome Production ( for the Physics workshop- June 2005)
  - Good levels of contribution within LCG ( about 6-8%); in CSC , IFIC is in the top 20
  - Important participation in SC4: data transfers, MC production , DA,...)



## Contribution of IFIC to the Distributed Production in WLCG :

Instance of Eowyn-Lexor was running at IFIC in the period : 2006-01-25 to 2006-08-07

ATLAS CSC : MC Distributed Production  
Contribution of the Eowyn-Lexor-IFIC instance



Total Jobs produced at WLCG :

**393733**

Total Jobs produced with  
Eowyn-Lexor at IFIC :

**62910**

Then, contribution : **16%**

Total Jobs produced using  
CPU resources at IFIC :

**5860**

Then, contribution : **1.5%**

Mainly 3 kind of problems in distributed production :

**Software bugs** (many jobs often fail due to same bug), **Data problems** (mostly input files), and **Site problems** (hardware, networking, installations)

- **Main Goal of TIER-2: to provide the fundamental infrastructure which enables the physicist to perform the Physics Analysis activities**
- **Data Analysis will have 2 components:**
  - ‘public activity’, scheduled activity run through the working groups, preparing datasets, etc; jobs involved would be developed at **TIER-2** sites using small sub-samples. The needs corresponding to this activity has been evaluated in the ATLAS Computing Model Report.
  - ‘private activity’, analysis run by individuals: typically direct analysis of AOD and production of private simulations.

Also DPD and subsamples of ESD may be readout by some users.  
Average resources needed: 1.5 KSI2K/user and 1.5 TB/user. These resources are denoted as **TIER-3**

**Number of analysts potential users of the system: 40 phys**  
**IFAE: 15 physicists, UAM: 10 physicists, IFIC: 15 physicists**



- **Distributed Analysis system is being developed with the aim to allow ATLAS users analysis as defined by the ATLAS Computing Model:**
  - **Data for analysis will be available distributed on all Tier-1 and Tier-2 centers (AOD,TAG, ESD and ROD)**
  - **T1 & T2 are open for analysis jobs**
  - **Users will send jobs to the data and extract relevant data (typically NTuples or similar)**
  
- **ATLAS strategy for distributed analysis in a heterogeneous grid environment has different approaches:**
  - **Direct submission to GRID**
    - **LCG → LCG/gLite Resource Broke and CondorG**
    - **OSG → PANDA**
    - **Nordugrid → ARC Middleware**
  - **Indirect submission to GRID**
    - **Production System → Seamless access to all ATLAS grid resources**

# Towards a Tier2 Distributed Analysis facility

- *Data transfer*

- To be able to run jobs on Tier2 facility, data are needed there.
- Distributed analysis is promoting data distribution over sites, and jobs are sent to sites to analyze the data
- work is in progress to complete the “collection” of data and achieve equal distribution between sites

- *Disk Area*

- Disk-only area of 4 TB capacities was put in place and dedicated storage endpoints were created at IFIC Tier2.

- *Job Priorities*

- ATLAS T2 is contributing in the implementation of job priorities and short queues:
- Short queue/CE for analysis jobs
- VOMS attribute to separate production from analysis

- *Collaboration :*

- ATLAS TIER 2 is participating in the DA prototype system together with CERN and NIKHEF

## 3.- Conclusions & Comments

- **The ATLAS distributed TIER-2 is conceived as an Infrastructure for High Energy Physics, for ATLAS, and its goal is to give the possibility of doing physics Analysis by Spanish physicists working in ATLAS experiment (UAM, IFAE and IFIC)**
- **Aspects to be covered:**
  - **To operate the TIER-2 infrastructure efficiently**
  - **To produce simulated events**
    - **In an official way**
    - **On demand (the GRID system is adequate to transform classical organizations in 'on demand' organizations)**
  - **Distributed Analysis on the GRID**
  - **Calibration and alignment of detectors**
  - **Interactive and 'private' analysis (TIER-3)**
    - **Graphics**
    - **Ntuple analysis**
    - **Express analysis**
  - **Fault tolerance Metacenter**

- **Progress in a lot of Operational Issues but the Spanish ATLAS TIER-2 should be seen as an ‘unique Virtual Infrastructure’ and this is difficult;**
- **moreover, Efficient Management and coordination is crucial in a project of a Federated Tier-2**
  - **To coordinate of 3 sites geographically distributed, and**
  - **Each site belongs to different institutions with different procedures and organization (Universities and CSIC)**
- **Coordination and Collaborative tools**
  - **working meetings:**
    - **Presential: 2 times/ year , next in Madrid 5-6 October 2006**
    - **By VRVS: 1 TIER-2 Operation Meeting / 2 weeks**
  - **Twiki of the Tier-2**
    - **<https://twiki.cern.ch/twiki/bin/view/Atlas/SpanishTier2>**
  - **Maling list for information and project discussions**
- **The involvement in the ATLAS GRID Computing activities have had the wished benefits:**
  - **To test the new features**
  - **To contribute in the Development / to validate procedures**
  - **To interact with the ATLAS Computing teams**

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- **Major worries:**

- **Readiness: I am have a positive feeling ...**
- **to get a Distributed Analysis System as soon as possible (short term)**
- **to move the physicists end users to the GRID Framework (short term)**
  - Our end-users ( the ATLAS physicists ) are joining.  
Problems:
    - To give User Support within the TIER-2
    - To get a high profit of the infrastructure and of the site redundancy due to the distributed of our TIER-2
- **sustainability of the TIER-2 along the years of the ‘experiment’s life’, mainly for the Human Resources ( medium term)**