

# Necesidades de Cálculo para los del Grupo Tilecal

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for the TileCal group



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# Overview

- ✚ Intro: Overview of Activities and Requirements from the TileCal group
- ✚ Overall Considerations w.r.t. the Tier3
- ✚ Express and Calibration streams
- ✚ Towards a Distributed Analysis Model for a Tier3

# Overview of Activities

✚ The following are the activities that are/will drive the computing needs of the group

## ➤ TileCal commissioning

### ❖ Hadronic Calibration

☐ Tails in MET

### ❖ DAQ issues

### ❖ Level2 Muon trigger

Work within the ATLAS  
TileCal Community

## ➤ Physics Analysis

### ❖ MSSM Higgs with $H/A \rightarrow \mu\mu$

☐ CSC note HG8. Thesis of A.Ruiz

### ❖ MSSM Higgs with $H/A \rightarrow \tau\tau$

☐ CSC note HG7. Thesis of C.Solans

### ❖ Inclusive SUSY with lepton veto

☐ CSC note SUSY5 & SUSY3

Thesis of X.Poveda

Work within the ATLAS  
Higgs Working Group

Work within the ATLAS  
SUSY Working Group

# Overall Computing Requirements

## + Data availability in IFIC (and/or Spain)

➤ Heavily pre-scaled calibration streams

➤ Express streams (Detector/physics)

Involves RAW/ESD data at Tier1

➤ Access to all data/MC AOD

Provided by dist. Tier2

## + CPU/Storage for analysis

➤ O(10) cores + >1TB per person

Provided by Tier3 + opportunist usage of Tier2 (?) and resources across grid

# Data Streams

- ✚ Spain is participating in the M4 data distribution. This is excellent practice for data taking.
- ✚ Need to define what calibration and express streams the group would like to have replicated in Spain
  - On the one hand, as TileCal experts the groups needs calibration streams. Need Spain to allocate corresponding resources
  - At the same time, due to physics interests and for the sake of competitiveness, the group also needs access to express streams. This is an effort that needs to be coordinated with the rest of the Valencia groups, and possibly other Spanish institutes, since the Tier1 needs to be involved

# Express Streams

## ✚ Preliminary list of signatures for the Express Stream

➤ List still under discussion and

Streams interesting for Physics/Detector  
performance preferences of the group



Decay or signature	Motivation
$Z \rightarrow l^+l^-$	calibration and data quality
minimum bias	data quality
lepton pair with high mass	alert on rare events
$B \rightarrow \mu^+\mu^-$	alert on rare events
$\geq 3$ high $p_T$ leptons	alert on rare events
lepton + jets + ETmiss	calibration
$W \rightarrow l\nu$	calibration and data quality
large missing $E_T$	alert on rare events
lepton with large $p_T$	alert on rare events
large $\Sigma E_T$	alert on rare events
large $M_{eff}$	alert on rare events
high multiplicity of trigger objects	alert on rare events

# TileCal Group and the Tier3

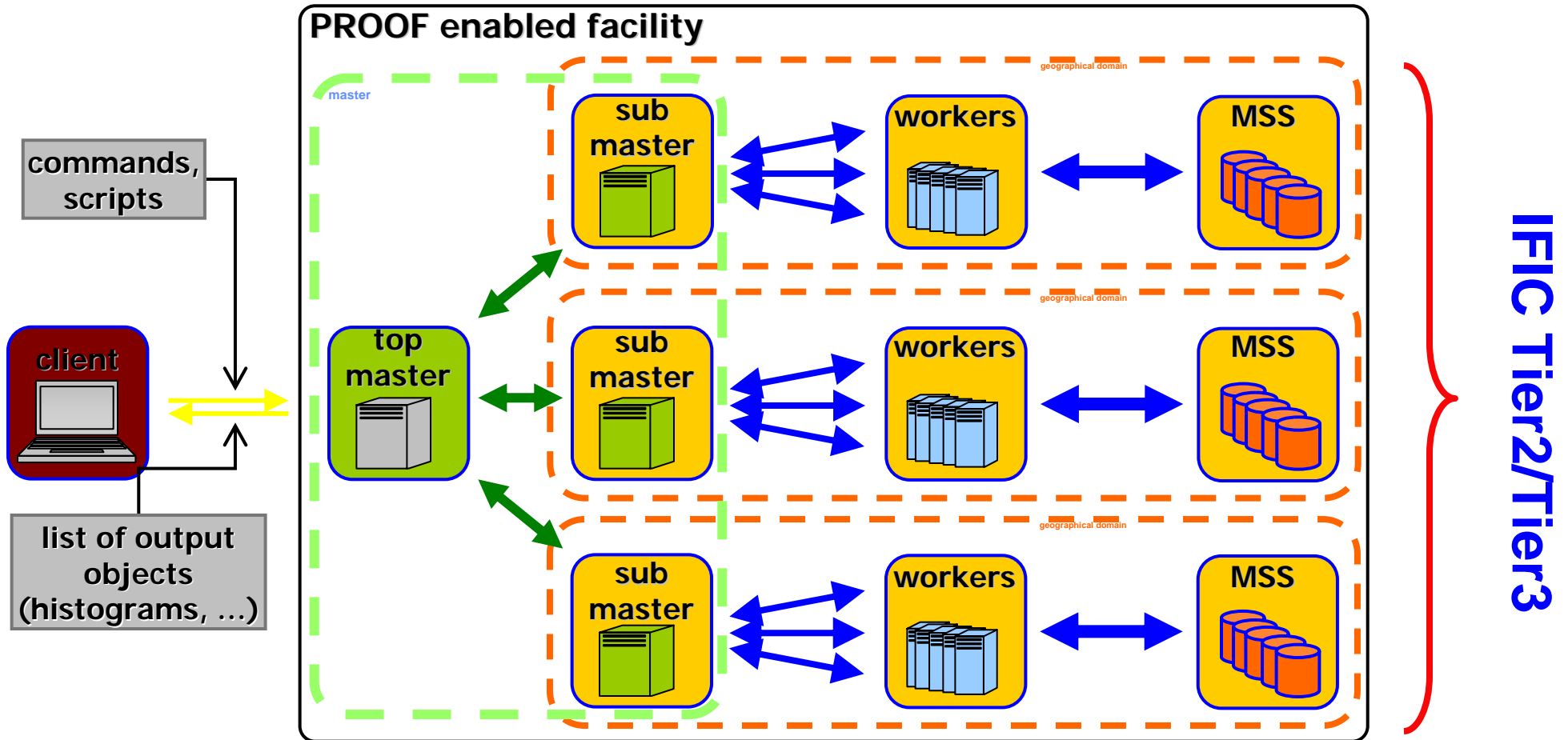
- ✚ Despite existence of ATLAS-wide distributed analysis system (by means of Ganga/Pathena, with the use of resource across the grids) it is mandatory that the group has local resource for data analysis
- ✚ Santiago proposes a very reasonable model for an analysis center: Extension of existing Tier2 facility with local resources with combined efforts of the various research groups in Valencia
  - This model is also followed in the US ATLAS. Take for instance plans for analysis center in the US ATLAS Tier1 at Brookhaven
  - In Madison the ATLAS and CMS groups share computing resource and strive for a homogeneous system (both hardware and software wise)

# The Distributed Analysis Model

- ✚ When data comes it will not be possible for the physicist to do analysis with ROOT in one node due to large data volumes
  - Need to move to a model that allows parallel processing for data analysis, or distributed analysis.
- ✚ As far as software for distributed analysis goes US ATLAS is going for the xrootd/PROOF system
  - Xrootd (SLAC) is a distributed file system, maintained by SLAC which is proven to support up to 1000 nodes with no scalability problems within this range
  - PROOF (the Parallel ROOT Facility, CERN) is an extension of ROOT allowing transparent analysis of large sets of ROOT files in parallel on compute clusters or multi-core computers

# PROOF in a Slide

PROOF: Dynamic approach to end-user HEP analysis on distributed systems exploiting the intrinsic parallelism of HEP data



## ✚ Structure of PROOF pool:

- Redirector
- Worker
- Supervisor

## ✚ Procedure of PROOF job:

- User submit the PROOF job
- Redirector find the exact location of each file
- Workers validate each file
- Workers process the root file
- Redirector collects the results and sends to user
- User make the plots

## ✚ Packetizers. They work like job schedulers.

- TAdaptivePacketizer (Default one, with dynamic packet size)
- TPacketizer (Optional one, with fixed packet size)
- TForceLocalPacktizer (Special one, no network traffic between workers. Workers only deal with the file stored locally)

Some Technical  
Details



To be optimized  
for IFIC T3



# Proof/Xrootd Tests

- ✚ The symbiosis xrootd/PROOF is being optimized in ATLAS by BNL/Wisconsin
  - Just started regular meetings. Perhaps Valencia T2 wants to join?
  - We are defining optimal proof/xrootd configurations for analysis farms corresponding to the requirements of ATLAS Tier3
- ✚ Have proven scalability with up to 100 nodes. Excellent performance for standard ROOT-based analysis codes
- ✚ Panda is also working on accommodating xrootd/PROOF for analysis jobs

# Most Recent Performance Test

