



PIC site report

VIRGO Computing Centres Workshop

G. Merino, Cascina 29 Nov 2019



**Institut de Física
d'Altes Energies**

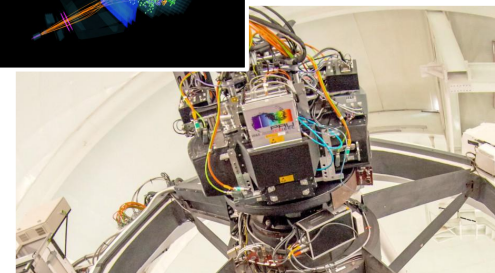
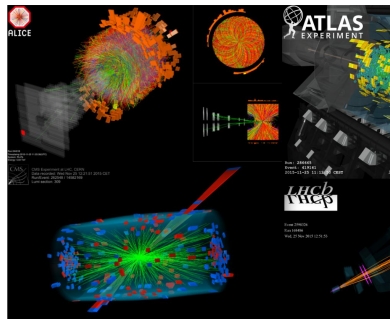


PIC data center

Collaboration agreement CIEMAT-IFAE. Founded in 2003. Located in UAB campus.

Mission: Participate at highest level in LHC Computing (Tier-1) and leverage experience to support other scientific activities.

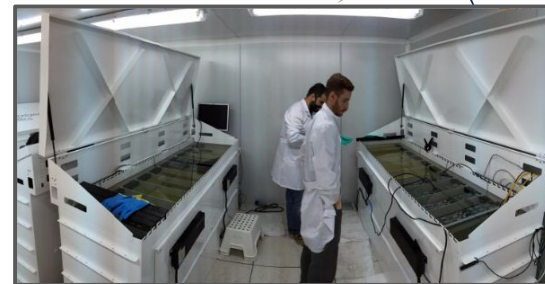
- LHC: Tier1 for ATLAS, CMS, LHCb; Tier2 and Tier3 for ATLAS
- Tier0 for MAGIC and PAU. SDC for EUCLID.
- Support for CTA LST prototype, DES, T2K, VIP (medical imaging), co2Flux (geoscience)



PIC data center

Data processing services

- 8500 CPU slots (HTCondor cluster)
- 10 PB disk (dCache) + 25 PB tape (Enstore)
- Bigdata platform (Hadoop/HIVE/Spark)
 - 448 cores/2TB RAM/16TB NVMe/60TB HD
 - Cosmology analysis web portal & data processing cluster

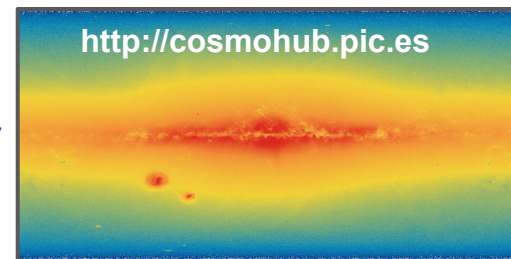


2x 10 Gbps connection to Research Networking

- Largest data mover in Spanish academic network: 27PB in/25 PB out last year

Compact installation. Refurbished in 2014-2016 to achieve high energy efficiency

- Innovative open bath liquid cooling



Gravitational Waves

Providing resources and support to the IFAE VIRGO group since about 1 year

- Interactive and batch CPU/GPU computing + disk space for local analysis

Joined the LIGO/VIRGO Grid in Summer 2019

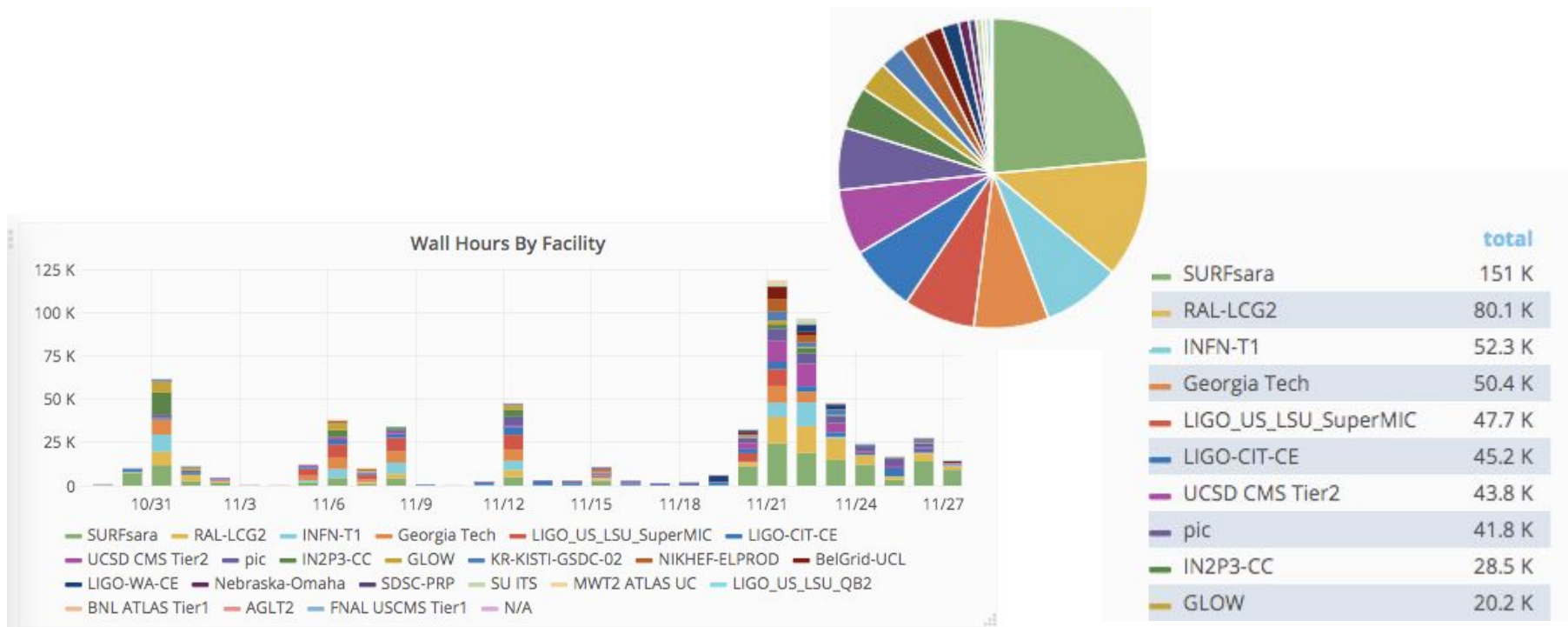
- CPU and GPU access through HTCondor
 - In few days we were connected and LIGO jobs were running at PIC
 - Also providing remote GPUs via HTCondor.

CVMFS mounted in the WNs:

- [/cvmfs/ligo.osgstorage.org/](https://cvmfs.ligo.osgstorage.org/)
- [/cvmfs/ligo-containers.opensciencegrid.org](https://cvmfs.ligo-containers.opensciencegrid.org/)
- [/cvmfs/oasis.opensciencegrid.org](https://cvmfs/oasis.opensciencegrid.org)

OSG CPU accounting (LIGO)

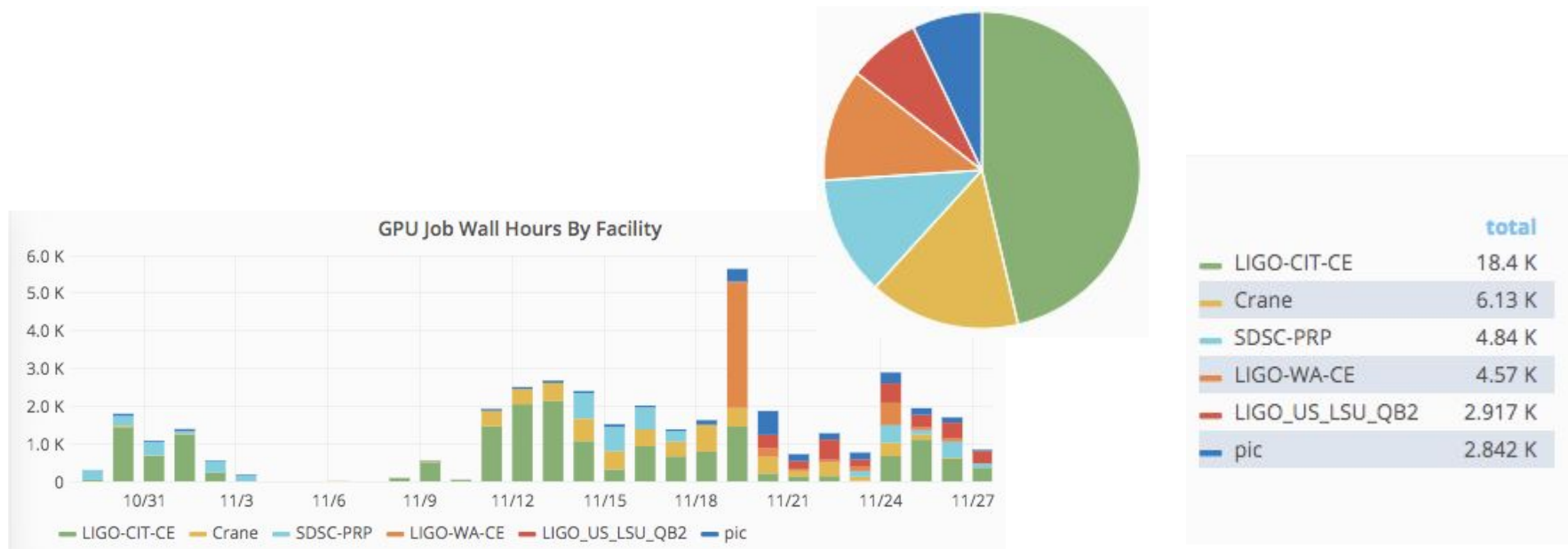
PIC providing ~6.5% of accounted CPU time (GRACC, last 30 days)



OSG GPU accounting (LIGO)

New GPU node (8x GeForce 2080Ti) recently added

- k8s node with shared load: interactive(jupyterhub) and batch(htcondor)



EGI CPU accounting (VIRGO)

Countries — Elapsed time * Number of Processors (hours) by Resource Centre and Month (Custom VOs)

Resource Centre	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Total	Percent
INFN-T1	151,094	1,710,127	555,522	1,130,726	634,053	4,181,522	78.68%
NIKHEF-ELPROD	108,154	87,599	106,659	8,423	17,634	328,469	6.18%
SARA-MATRIX	7,751	62,731	61,172	63,472	54,338	249,465	4.69%
pic	1,495	23,087	17,694	52,135	90,546	184,958	3.48%
RAL-LCG2	1,305	11,758	7,447	22,499	101,636	144,645	2.72%
IN2P3-CC	4,532	20,648	63,110	38,531	14,483	141,304	2.66%
BelGrid-UCL	0	306	1,685	6,195	32,328	40,515	0.76%
UA-IRE	18,039	981	0	7,918	6,113	33,052	0.62%
UA_ICYB_ARC	0	0	0	2,635	4,716	7,351	0.14%
UA_BITP_ARC	0	0	0	1,405	501	1,906	0.04%
UA-PIMEE	0	542	679	96	0	1,318	0.02%
Total	292,371	1,917,780	813,968	1,334,036	956,348	5,314,504	
Percent	5.50%	36.09%	15.32%	25.10%	18.00%		

Summary and Plans

So far, only opportunistic access to CPU and GPU cycles at PIC.

- No GW-computing dedicated funding yet.
 - Opportunity to request dedicated funding in Sep 2020.
- Good news is that using a “common stack” facilitates our job a lot to make an effective contribution.

Next action planned on the VIRGO/LIGO setup at PIC

- xCache server with ~20 TB disk space for CVMFS ligo.osgstorage.org data
 - Interested in exploring k8s based installation and configuration

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