

CLAS12 simulations on OSG

GEMC/OSG status and Outlook
New STRINGID
How to submit Jobs

GEMC Recent and Upcoming changes

5.4 ("pro" since yesterday) Release Notes

- RF Frequency > RF Period
- Read RF parameters from DB if RFSETUP is set to clas12_ccdb
- RICH digitization, geometry (Connor Pecar, partially completed)
- Time to tdc constants from CCDB
- Fadc_time fix 1 (fix 2 in 5.5)

The following options are added/updated in the gcard to enable truth matching:

- SAVE_ALL_MOTHERS=1
- SKIPREJECTEDHITS=1

Not in the gcard but on OSG:

- INTEGRATEDDRAW="*"

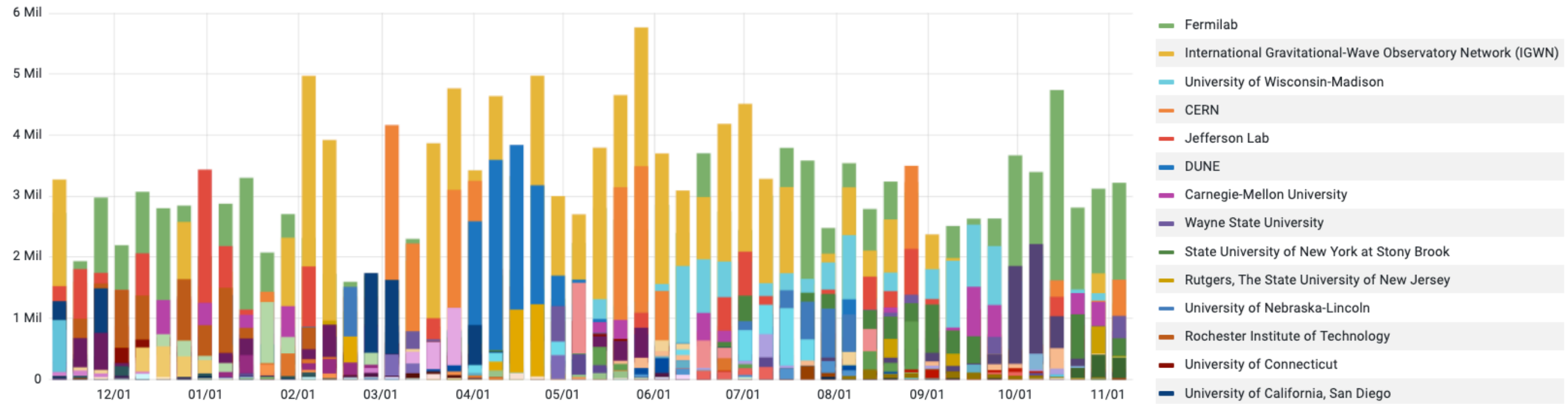
ITEM	DESCRIPTION		MATERIAL	THICKNESS	LOCATION (Z)
I	TARGET CELL ENTRY	B00000-03-01-0100	ALUMINUM	30um	1328.27mm
II	TARGET CELL EXIT	B00000-03-01-0100	ALUMINUM	30um	1278.27mm
III	CELL MLI BARRIER		ALUMINUM	15um	1248.27mm
IV	SCATTERING CHAMBER EXIT	B00000-03-01-0300	ALUMINUM	50um	1017.27mm
V	VACUUM VOL. ENTRY (DOWNSTREAM)	B00000-02-07-0210	ALUMINUM	75um	311.24mm

Upcoming 5.5 Changes

- updated uRwell digitization
- FADC time is double not int. Precision is 62.5ps
- FT Cal and FT Hodo timing fix
- Vacuum Windows fixes
- - -v, --v, -version, --version will show the version of gemc and some introspection

CLAS12 Simulations on OSG: usage

Core Hours by Institution



Projects

PI Name	Organization	Field of Science	Project Name	Core Hours
Peter F. Couvares	International Gravitational-Wave Observatory Network (IGWN)	Gravitational Physics	LIGO	67.60 Mil
Francis Halzen	University of Wisconsin-Madison	Astrophysics	IceCube	62.93 Mil
Achille Petrelli	CERN	Particle Physics	cms.org.cern	52.37 Mil
Joe Boyd	Fermilab	High Energy Physics	fermilab	43.98 Mil
Thomas Robert Junk	DUNE	High Energy Physics	dune	37.07 Mil
Olexandr Isayev	Carnegie-Mellon University	Chemical Sciences	TG-CHE200122	31.35 Mil
Maurizio Ungaro	Jefferson Lab	Nuclear Physics	CLAS12	30.23 Mil
Chun Shen	Wayne State University	Nuclear Physics	WSU_3DHydro	28.97 Mil
Joe Boyd	Fermilab	High Energy Physics	microboone	26.22 Mil

OSG Resources Summary

1 core = 24*365 = 8760 hours / year

Dedicated, paid for by CLAS12 institutions

OSG Name	Country/Institution	Number of CPUs	MHours / Year
INFN-T1	Istituto Nazionale di Fisica Nucleare, Italy	600	5.3
UKI-SCOTGRID-GLASGOW	Glasgow University, Scotland	900	7.9
MIT*	Massachusetts Institute of Technology, USA	320 (2000)	2.8
LAMAR	Lamar University, USA	200	1.7

Back Online!

* accepts other projects if cores are idles. Occasionally allocates more.

Summary of resources

OSG Name	Number of CPUs	MHours / Year
Dedicated (Guaranteed)	2000	17.7
High Priority	16000	140
Opportunistic	10000	88
Total	28000	245

Summary of current jobs

user	submission	total	done	run	idle
carman	5	50000	16629	28353	4987
total	5	50000	16629	28353	4987

High Priority and Opportunistic

OSG Name	Country/Institution	Number of CPUs	MHours / Year
UCONN	University of Connecticut, USA	2,500	17.5
SU	Syracuse University	13,000	113
GRIF	Grille au service de la Recherche en Ile-de-France, France	500	4.4
OSG	OSG Opportunistic	10,000	88

CLAS12 Simulations on OSG: Generators

<https://github.com/JeffersonLab/clas12-mcgen>

name	description	maintainer
clasdis	SIDIS MC based on PEPSI LUND MC	Harut Avakian
claspyth	SIDIS full event generator based on PYTHIA	Harut Avakian
dvcsgen	DVCS/pi0/eta generator based on GPD and PDF parameterizations	Harut Avakian
genKYandOnePion	KY, pi0P and pi+N	Valerii Klimenko
inclusive-dis-rad	Inclusive electron and optionally radiative photon using PDFs	Harut Avakian
tcsgen	Timelike Compton Scattering	Rafayel Paremuzyan
jpsigen	J/Psi photoproduction	Rafayel Paremuzyan
twopeg	pi+pi- electroproduction off protons	Iuliia Skorodumina
clas12-elspectro	General electroproduction final states	Derek Glazier
MCEGENpiN_radcorr	Exclusive single pion electroproduction based on MAID	Maksim Davydov
deep-pipi-gen	Deep double pion production	Dilini Bulumulla
genepi	Photon and meson electroproduction	Noémie Pilleuxi
onepigen	Single charged pion production based on AO/Daresbury/MAID	Nick Tyler
GiBUU	not supported on OSG yet, pending configuration wrapper script and LUND output	Rhidian and e4nu group
GENIE	not supported on OSG yet, pending configuration wrapper script and LUND output	

Fortran

Fortran

Fortran

C++

Fortran

C++

C++

C++

C++

C++

C++

C++, New

C++, Upcoming

Please consider adding generator to clas12-mcgen. Contact Nathan / Mauri.

Recent changes to OSG Portal

- Software versions available in the dropdown menus are loaded from a JSON file. Latest versions are pre-selected
- Workflow steering files (GCARDS and YAMLS) come from the new repository **jeffersonLab/clas12-config**
- De-noising added for pass2 software. Applied to all configurations. If desired a radio box could be added.
- Vertex configurations loaded for each configuration are loaded from a JSON file
- Geant4 warnings removed from output log
- Optional User-defined STRINGID defines output filename
- Output files not split in sub-dirs. /volatile/clas12/osg

https://gemc.jlab.org/web_interface

Home

Summary of current jobs

user	submission	total	done	run	idle
valerii	2	1020	0	1020	0
lixu	1	1000	747	253	0
pilleux	1	1000	968	31	0
yijie	1	25	3	22	0
shrestha	1	100	0	100	0
total	6	3145	1718	1426	0

Click to submit to OSG

Generator

- clas12-mcgen or gemc internal generator
- Arbitrary number of jobs
- Arbitrary number of events per job (max 10,000)

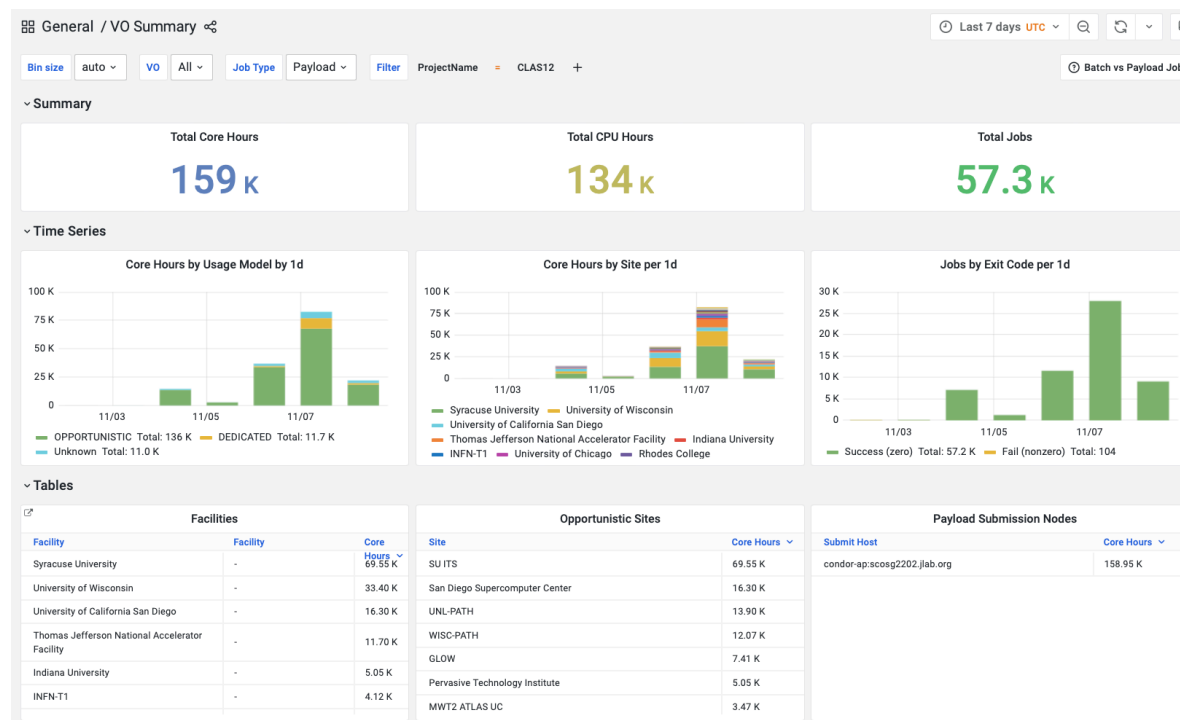
LUND Files

- LUND files (.txt) from a web location
- One job per LUND file
- File define number of events per job (max 10,000)

Details of current OSG Jobs

user	job id	submitted	total	done	run	idle	hold	osg id
valerii	6745	11/02 18:28	1000	0	1000	0	0	2164
valerii	6747	11/04 01:02	20	0	20	0	0	2178
lixu	6752	11/06 06:06	1000	747	253	0	0	2183
pilleux	6755	11/06 11:44	1000	968	31	0	1	2186
yijie	6762	11/08 14:58	25	3	22	0	0	2192
shrestha	6763	11/08 15:54	100	0	100	0	0	2193

OSG Stats



Monitors



About

Submitting Jobs

When you click the "Submit" button:

- 1: Your submission is saved in our mysql db
- 2: Within a few minutes your jobs will be submitted to OSG and visible in this portal.
- 3: When the jobs are completed, the job will be delisted from the portal.
- 4: The output directory is synced every hour on /volatile/clas12/osg2

The number of events per job are limited to 10,000 corresponding to a time on the OSG between 4-10 hours depending on the node CPU

HOWTOS:

- Submit Jobs to OSG CLAS12 Software Center

Experiment Configurations, Gcards and Yaml Files

The job workflow and steering cards are maintained in the clas12-config repo.

Background Merging

The user choice of experiment and magnetic fields enable the possibility of background merging in the dropdown menu.

If selected, a random file among the available pool (files of 10k events each) is merged to the simulated events before reconstruction.

Output

The output is synced hourly on

`/volatile/clas12/osg/"username"/job_OSGID`

where "username" is your job account name and OSGID is the OSG submission ID.

The optional string identifier STRINGID, the OSG JOB ID and the JOBINDEX are used to form the filenames:

- STRINGID-OSGID-JOBINDEX.nipo for type 1 submissions
 - STRINGID-LUNDFILENAME-OSGID-JOBINDEX.nipo for type 2 submissions
- STRINGID may be set by users on the submission form. If you submit 500 jobs, JOBINDEX will run from 0 to 499.

Priority

A priority system is in place to ensure that the resources are shared among all submissions.

Analysis groups can submit the Priority Permission Increase Form to increase an account priority.

OSG Portal Submission

Configurations:

Define the gcard/yaml pairing from clas12-config

<u>Configuration</u>	rga_spring2018
<u>Versions (see README)</u>	gemc/5.4 coatjava/10.0.2
MC Gen Versions (see README) Consider testing the generators	2.33
<u>Magnetic Fields</u>	or-1.00_sol-1.00
<u>Vertex</u>	length -1.94*cm, 2.5*cm m, 0.0*mm, 0.0*mm, 0*deg Vertex <input type="radio"/> Relative to Generator Vertex
<u>Generator</u>	
<u>Generator Options</u>	
Once you've chosen the generator and insert the desired options above. Do not utilize the following options: --docker, output file name, --trig .	
Number of Events per Job	
Number of Jobs	
Total Number of Events	
<u>Background Merging</u>	No
<u>String Identifier (optional)</u>	
	Submit

- rga_fall2018
- rga_spring2018
- rga_spring2019
- rgb_fall2019
- rgb_spring2019
- rgc_summer2022_Elmo
- rgc_summer2022_FTOn
- rgk_fall2018_FTOff
- rgk_fall2018_FTOn

OSG Portal Submission

Configuration rga_spring2018

Versions (see [README](#)) gemc/5.4 coatjava/10.0.2

MC Gen Versions (see [README](#))
Consider [testing the generators](#) 2.33

Magnetic Fields tor-1.00_sol-1.00

Vertex semi-length -1.94*cm, 2.5*cm
0.0*mm, 0.0*mm, 0.0*mm, 0*deg

Operator Vertex Relative to Generator Vertex

clas12-config

The standard run-group configuration files for GEMC, COATJAVA, chef workflow configurations, etc.

Standard Combinations

Run Group	Run Period	Pass	Coatjava	GEMC(s)
RG-A	Fall '18	2	10.0.2	5.4
RG-A	Spring '19	2	10.0.2	5.4
RG-B	Spring '19	2	10.0.2	5.4
RG-B	Fall '19	2	10.0.2	5.4
RG-K	Fall '18	2	10.0.2	5.4
RG-M	Fall '21	1	10.0.2	5.4
RG-A	Fall '18	1	6.5.6.1	4.4.2
RG-A	Spring '19	1	6.5.6.1	4.4.2
RG-B	Spring '19	1	6.5.9	4.4.2
RG-B	Fall '19	1	6.5.9	4.4.2
RG-K	Fall '18	1	6.5.6.1	4.4.2
RG-C			10.0.2	5.4
RG-D	Spring '24			
RG-E				
RG-F				
RG-L				

Submit

✓ gemc/5.4 coatjava/10.0.2
gemc/4.4.2 coatjava/6.5.9
gemc/4.4.2 coatjava/6.5.6.1

Software versions

4.4.2 has evio output, uses evio2hipo, no vertex manipulation

5.4 has hipo output, uses de-noising, vertex manipulation, RF from CCDB, binary field maps

README is a link to the clas12-config repo

OSG Portal Submission

README links
to clas12-mcgen

<u>Configuration</u>	rga_spring2018
<u>Versions (see README)</u>	gemc/5.4 coatjava/10.0.2
MC Gen Versions (see README) Consider testing the generators	2.33
<u>Magnetic Fields</u>	tor-1.00_sol-1.00
<u>Vertex</u>	<input checked="" type="checkbox"/> z: adjust for target position and semi-length -1.94*cm, 2.5*cm <input checked="" type="checkbox"/> x/y: smear beamspot 0.0*mm, 0.0*mm, 0.0*mm, 0.0*mm, 0*deg <input checked="" type="checkbox"/> x/y: raster 0.0*cm, 0.0*cm <input type="radio"/> Ignore Generator Vertex <input type="radio"/> Relative to Generator Vertex
<u>Generator</u>	
<u>Generator Options</u>	

Test Generators

Before submitting large scale jobs to OSG it is recommended to test the generator. This can be done on the JLab cue machines.

To test mcgen version X (2.33 for example):

```
module load clas12
module switch mcgen/X
clasdis --t 20 25
dvcsngen --beam 10.604 --x 0.05 0.85 --trig 100 --q2 0.9 14 --t 0 0.79 --gpd 101 --y 0.15 0.9 --w 3.61 --zpos -3 --zwidth 5 --raster 0.025
```

Notice on the portal the additional arguments will be given:

```
--trig #nevents
--docker
--seed #seed
```

OSG Portal Submission

Vertex manipulation:

- Target position and length
- Raster
- Beam spot and size

<u>Configuration</u>	rga_spring2018 ▾
<u>Versions (see README)</u>	gemc/5.4 coatjava/10.0.2 ▾
<u>MC Gen Versions (see README)</u> Consider testing the generators	2.33 ▾
<u>Magnetic Fields</u>	tor-1.00_sol-1.00 ▾
<u>Vertex</u>	<input checked="" type="checkbox"/> z: adjust for target position and semi-length -1.94*cm, 2.5*cm <input checked="" type="checkbox"/> x/y: smear beamspot 0.0*mm, 0.0*mm, 0.0*mm, 0.0*mm, 0*deg <input checked="" type="checkbox"/> x/y: raster 0.0*cm, 0.0*cm <input checked="" type="radio"/> Ignore Generator Vertex <input type="radio"/> Relative to Generator Vertex
<u>Generator</u>	▾
<u>Generator Options</u>	<input type="text"/>
<p>Once you've chosen the generator, review the linked documentation and insert the desired options above. Do not utilize the following options, as they are automatically included: <i>--docker, output file name, --trig</i> .</p>	
Number of Events per Job	<input type="text"/>
Number of Jobs	<input type="text"/>
Total Number of Events	<input type="text"/> M
<u>Background Merging</u>	No ▾
<u>String Identifier (optional)</u>	<input type="text"/>
Submit	

OSG Portal Submission

Configuration	<input type="text" value="rga_fall2018"/>
Versions (see README)	<input type="text" value="gemc/5.4 coatjava/10.0.2"/>
MC Gen Versions (see README) Consider testing the generators	<input type="text" value="2.33"/>
Magnetic Fields	<input type="text" value="tor-1.00_sol-1.00"/>
Vertex	<input checked="" type="checkbox"/> z: adjust for target position and semi-length <input type="text" value="-3.0*cm, 2.5*cm"/> <input checked="" type="checkbox"/> x/y: smear beamspot <input type="text" value="0.0*mm, 0.0*mm, 0.0*mm, 0.0*mm, 0*deg"/> <input checked="" type="checkbox"/> x/y: raster <input type="text" value="0.0*cm, 0.0*cm"/> <input checked="" type="radio"/> Ignore Generator Vertex <input type="radio"/> Relative to Generator Vertex
Generator	<input type="text" value="clasdis"/>
Generator Options	<input type="text"/>
<p>Once you've chosen the generator, review the linked documentation and insert the desired options above. Do not utilize the following options, as they are automatically included: <code>--docker</code>, <code>output file name</code>, <code>--trig</code>.</p>	
Number of Events per Job	<input type="text"/>
Number of Jobs	<input type="text"/>
Total Number of Events	<input type="text"/> M
Background Merging	<input type="text" value="No"/>
String Identifier (optional)	<input type="text"/>
<input type="button" value="Submit"/>	

- clas12-elSpectro
- clasdis
- claspyth
- deep-pipi-gen
- dvcsgen
- genKYandOnePion
- inclusive-dis-rad
- JPsiGen
- MCEGENpiN_radcorr
- TCSGen
- twopeg
- genepi
- onepigen
- gemc

Generator
README
with
available
options

← clasdis options

OSG Portal Submission

Type 1

STRINGID = non given

```
$ ls -l job_391/output
```

```
391-0.hipo  
391-10.hipo  
391-11.hipo  
391-12.hipo  
391-13.hipo  
391-14.hipo  
391-15.hipo  
391-16.hipo  
391-17.hipo  
391-18.hipo  
391-19.hipo  
391-1.hipo  
391-20.hipo  
391-21.hipo  
391-22.hipo  
391-23.hipo  
391-24.hipo  
391-25.hipo  
391-26.hipo  
391-27.hipo  
391-28.hipo  
391-29.hipo  
391-2.hipo  
391-3.hipo  
391-4.hipo  
391-5.hipo  
391-6.hipo  
391-7.hipo  
391-8.hipo  
391-9.hipo
```

OSG Portal Submission

Type 1

STRINGID = "test2-33-old_new"

```
$ ls -l job_393/output
```

```
test2-33-old_new-393-0.hipo  
test2-33-old_new-393-10.hipo  
test2-33-old_new-393-11.hipo  
test2-33-old_new-393-12.hipo  
test2-33-old_new-393-13.hipo  
test2-33-old_new-393-14.hipo  
test2-33-old_new-393-15.hipo  
test2-33-old_new-393-16.hipo  
test2-33-old_new-393-17.hipo  
test2-33-old_new-393-18.hipo  
test2-33-old_new-393-19.hipo  
test2-33-old_new-393-1.hipo  
test2-33-old_new-393-20.hipo  
test2-33-old_new-393-21.hipo  
test2-33-old_new-393-22.hipo  
test2-33-old_new-393-23.hipo  
test2-33-old_new-393-24.hipo  
test2-33-old_new-393-25.hipo  
test2-33-old_new-393-26.hipo  
test2-33-old_new-393-27.hipo  
test2-33-old_new-393-28.hipo  
test2-33-old_new-393-29.hipo  
test2-33-old_new-393-2.hipo  
test2-33-old_new-393-3.hipo  
test2-33-old_new-393-4.hipo  
test2-33-old_new-393-5.hipo  
test2-33-old_new-393-6.hipo  
test2-33-old_new-393-7.hipo  
test2-33-old_new-393-8.hipo  
test2-33-old_new-393-9.hipo
```


OSG Portal Submission

Type 2

STRINGID = "test2_test1_new-old"

LUND FILES:

dis_1.txt

dis_2.txt

```
$ ls -l job_386/output
```

```
test2_test1_new-old-dis_1-386-3.hipo
```

```
test2_test1_new-old-dis_2-386-4.hipo
```

Questions, Feedback?

Home

Summary of current jobs

user	submission	total	done	run	idle
valeri	2	1020	0	1020	0
lku	1	1000	747	253	0
pilloux	1	1000	968	31	0
yjie	1	25	3	22	0
shrestha	1	100	0	100	0
total	6	3145	1718	1426	0

Click to submit to OSG

Generator

- class2-ecpp or generic internal generator
- Arbitrary number of jobs
- Arbitrary number of events per job (max 10,000)

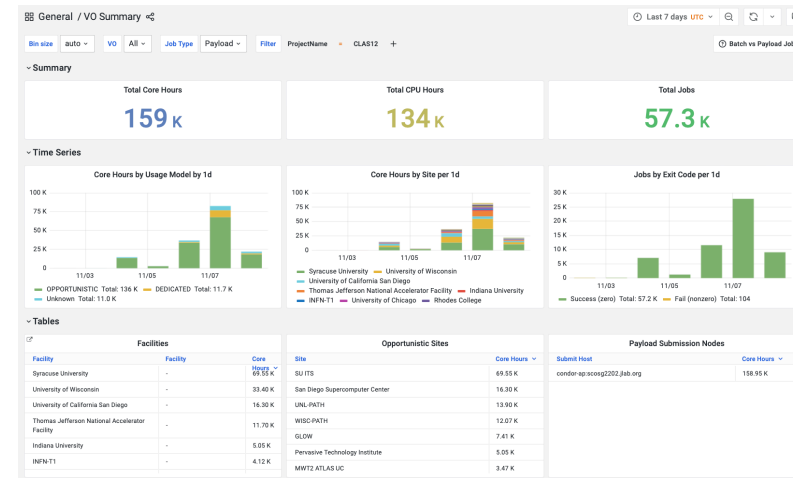
LUND Files

- LUND files [url] from a web location
- One job per LUND file
- File define number of events per job (max 10,000)

Details of current OSG Jobs

user	job id	submitted	total	done	run	idle	hold	osg id
valeri	6745	11/02 18:28	1000	0	1000	0	0	2164
valeri	6747	11/04 01:02	20	0	20	0	0	2178
lku	6752	11/06 06:06	1000	747	253	0	0	2183
pilloux	6755	11/06 11:44	1000	968	31	0	1	2188
yjie	6762	11/08 14:58	25	3	22	0	0	2192
shrestha	6763	11/08 15:54	100	0	100	0	0	2193

OSG Stats



Monitors



About

Submitting Jobs

When you click the "Submit" button:

- 1. Your submission is queued in our input job.
- 2. Within a few minutes your jobs will be submitted to OSG and visible in this portal.
- 3. When the jobs are completed, the job will be deleted from the portal.
- 4. The output directory is spread every hour on Jodotree (12h).

The number of events per job are limited to 10,000 corresponding to a time on the OSG between 4-10 hours depending on the node CPU.

HOWTO:

- Submit Jobs to OSG CLAS12 Software Center

Experiment Configurations, Gcards and Yaml Files

The job workflow and steering cards are maintained in the `class2-config` repo.

Background Merging

The user choice of experiment and magnetic fields enable the possibility of background merging in the dropdown menu. If selected, a random file among the available pool files of 10k events each) is merged to the simulated events before reconstruction.

Output

The output is spread hourly on

```
/volatile/class2/osg/username/job_OSGID
```

where "username" is your job account name and OSGID is the OSG submission ID.

The optional string identifier STRINGID, the OSG JOB ID and the JOBINDEX are used to form the filenames.

- STRINGID-OSGJOBINDEX-OSGJOBINDEX.Npx for type 1 submissions
- STRINGID-LUNDFILENAME-OSGJOBINDEX.Npx for type 2 submissions

STRINGID may be set by users on the submission form. If you submit 500 jobs, JOBINDEX will run from 0 to 499.

Priority

A priority system is in place to ensure that the resources are shared among all submissions.

Analyst groups can submit the Priority Permission Increase Form to increase an account priority.