

A quick tour of computing-related topics in CP3

What you can do, how to do it and who to ask when
you're lost

Local team

Three physicists to help you in your daily work:

- Pavel Demin
- Andres Tanasijczuk
- Jérôme de Favereau

Contact:

- CP3 issue tracking
cp3-git.irmp.ucl.ac.be/cp3-support/helpdesk/issues
or IRMP intranet → computing → tickets system
- if the tracker is not suitable,
cp3-support@listes.uclouvain.be

Other contacts

UCLouvain IT:

- 8282@uclouvain.be
- phone: (0104) 78282 (french preferred)

UCLouvain other contacts:

- (010 4) 7 2222: **emergencies**
- (010 4) 7 2424: 24/7 contact for non-emergencies

Computing cluster management (CISM)

- egs-cism@listes.uclouvain.be

How to avoid using these ?

CP3 IT documentation:

- cp3-git.irmp.ucl.ac.be/cp3-support/helpdesk
- IRMP Intranet → computing → computing wiki

CP3 administrative documentation:

- cp3-git.irmp.ucl.ac.be/cp3/users-wiki
- IRMP Intranet → general → Users wiki
- collaborative: only filled by CP3 members

UCLouvain IT homepage:

- intranet.uclouvain.be/fr/myucl/services-informatiques

Basics

Your Accounts

UCLouvain (all members)

- for email, wifi and uclouvain intranet

CP3 (get it from our secretary)

- for CP3 tools (issues, travels, preprints, profile, gitlab...)

Indico (create it on agenda.irmp.ucl.ac.be)

- for the agenda

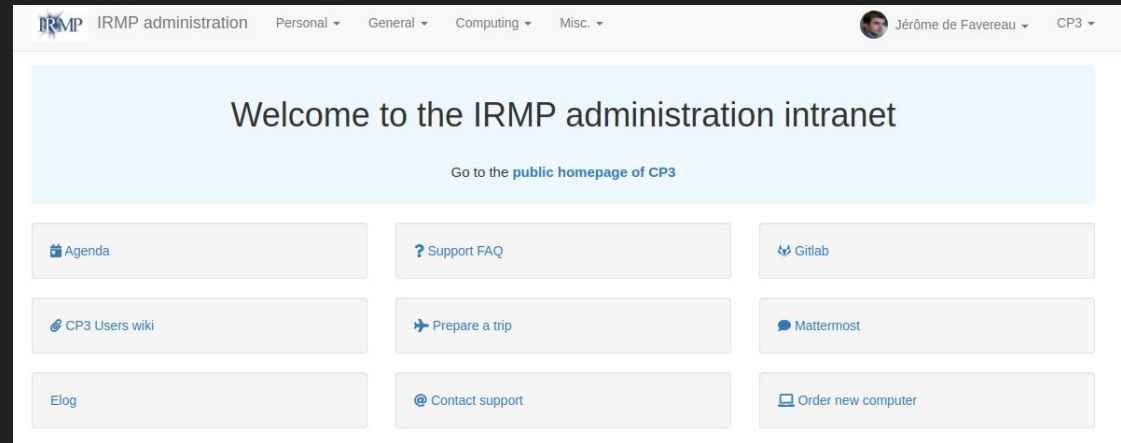
CECI (create it on www.ceci-hpc.be)

- for the computing cluster(s)

CP3 websites

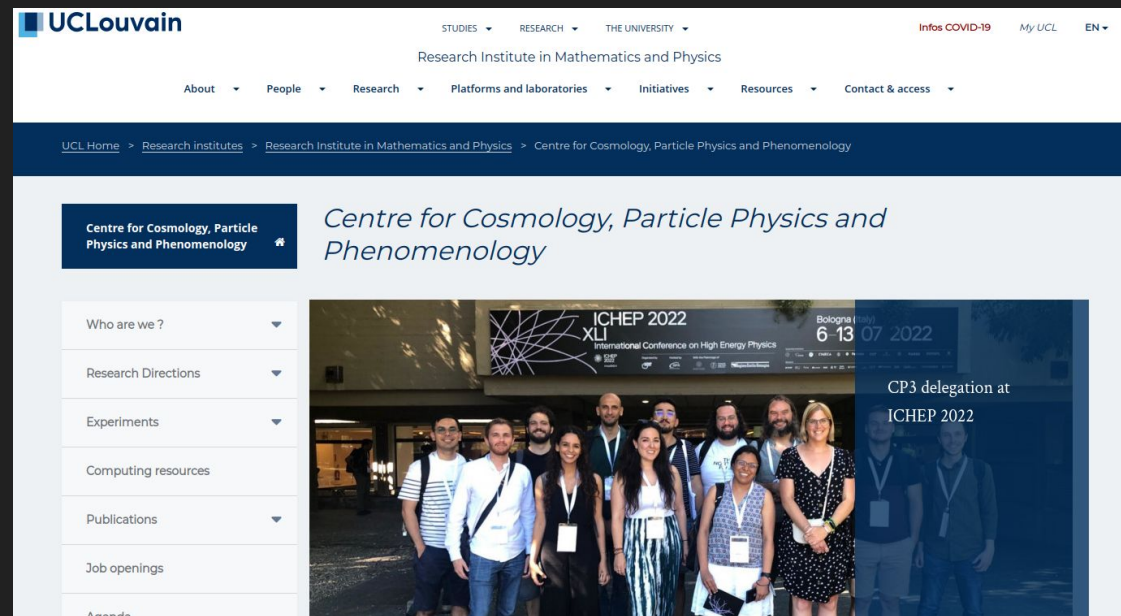
The CP3/IRMP intranet:

cp3.irmp.ucl.ac.be/intranet



The CP3 public website:

cp3.irmp.ucl.ac.be



Email

Email is managed by UCLouvain

- completely delegated to Microsoft Outlook
- webmail: outlook.office.com/mail/inbox
- configuration of clients:
intranet.uclouvain.be/fr/myucl/services-informatiques/mail-comparaison-clients-de-messagerie.html
- recommended clients: Apple Mail, Microsoft Outlook, or just use the webmail. **Thunderbird is not supported by UCLouvain anymore.**
- Credentials : uclouvain email address and password

Network

Cable connection (better stability)

- requires registration by cp3-support (security reasons)
- guests can use it too: IRMP intranet → computing → guest connection

Wifi (managed by UCLouvain)

- main network: UCLouvain / eduroam (equivalent)
- login: uclouvain email address and password
- guests: use eduroam or register for a temporary account

intranet.uclouvain.be/fr/myucl/services-informatiques/wifi-demande-d-acces-visiteur.html

Backups

Make sure you have a reliable backup system, disks die everyday. UCLouvain provides:

- Incremental backups every day
- 150GB storage

Conditions:

- being connected to the cable network
- having a UCLouvain laptop

Help:

intranet.uclouvain.be/fr/myucl/services-informatiques/backup.html

Printers

Default printer: RICOH copier 3rd floor

- printing (color, staples, etc.)
- scanning
- copies
- print from usb stick

Installation: [computing wiki](#) → printing

Software

Windows / Mac:

- Use the uclouvain automated software tool:
intranet.uclouvain.be/fr/myucl/services-informatiques/landesk-portail-d-installation-logiciels.html
- Provide an account number if the software is not free
- When in doubt, fill a CP3 issue
- No more Mathematica home-use unfortunately, use the network license (see CP3 wiki)

Windows only:

- if you need administrator access, you can use the 'CII' application from the system tray.

Software

Linux:

- use your distribution's package manager

Some scientific tools are available on the computing cluster
(details later)

IRMP intranet

The screenshot shows the IRMP intranet homepage. At the top, there is a navigation bar with the IRMP logo, the text "IRMP administration", and several menu items: "Personal", "General", "Computing", and "Misc.". On the right side of the navigation bar, there is a user profile for "Jérôme de Favereau" and a "CP3" menu item. The main content area features a large light blue banner with the text "Welcome to the IRMP administration intranet" and a link to "Go to the public homepage of CP3". Below the banner, there is a grid of nine rectangular buttons, each with an icon and a label: "Agenda" (calendar icon), "Support FAQ" (question mark icon), "Gitlab" (Git logo icon), "CP3 Users wiki" (document icon), "Prepare a trip" (airplane icon), "Mattermost" (speech bubble icon), "Elog" (document icon), "Contact support" (at-sign icon), and "Order new computer" (laptop icon).

IRMP IRMP administration Personal General Computing Misc. Jérôme de Favereau CP3

Welcome to the IRMP administration intranet

Go to the [public homepage of CP3](#)

- Agenda
- Support FAQ
- Gitlab
- CP3 Users wiki
- Prepare a trip
- Mattermost
- Elog
- Contact support
- Order new computer

Personal profile

Check and fill your profile: personal → modify my profile

Used for visibility:

- public homepage
- contact information

Important fields:

- office phone number
- office number
- research description
- profile picture
- nationality



The screenshot shows a personal profile for Jérôme de Favereau. At the top right, there is a small Belgian flag. The name "Jérôme de Favereau" is displayed in a blue font. Below the name is a profile picture of a man with dark hair. To the right of the picture is a text description: "CP3 website developement and maintenance, issue tracking system, general support, cluster maintenance, openstack deployment, CMS detector upgrade among other things...". Below the description is a link labeled "Research profile". At the bottom of the profile, there are three lines of contact information: "Office: E.356", "Phone: (+32 10 4) 7 3113", and "Email: jerome.defavereau@uclouvain.be".

Jérôme de Favereau

 CP3 website developement and maintenance, issue tracking system, general support, cluster maintenance, openstack deployment, CMS detector upgrade among other things...

[Research profile](#)

Office: E.356

Phone: (+32 10 4) 7 3113

Email: jerome.defavereau@uclouvain.be

Personal homepage

Fill your homepage: personal → edit my homepage

- Linked from public website
- Automatic content:
 - contact information
 - your team (academics only)
 - recent publications
 - current projects in CP3
- Custom content:
 - teaching
 - research statement
 - anything you want...

Traveling

Mandatory for research trips:

- Supervisor's approval
- Approved billing account for travel agency
- UCLouvain travel forms with IRMP president signature

All managed through our system: personal → prepare a trip

Don't forget to fill the 'contract type' field.

Expenses reimbursement is managed by UCLouvain:

- MyUCL → 'Finances' widget → Notes de frais
- add the widget if missing ([link](#))

Preprints

All papers need to be registered in the CP3 preprints system:
general → add/manage preprints

- Recent preprints are shown on the public website
- Your preprints list appears on your homepage
- Your preprints are automatically added to the UCLouvain publications system (DIAL) once they are published

Latest preprints

Superradiance in stars: non-equilibrium approach to damping of fields in stellar media

Chadha-Day, Francesca and Garbrecht, Björn and McDonald, Jamie

[\[Abstract\]](#) [\[PDF\]](#) [\[Journal\]](#) [\[Dial\]](#)

Refereed paper. January 26.

Scanning the landscape of axion dark matter detectors: Applying gradient descent to experimental design

McDonald, J. I.

[\[Abstract\]](#) [\[PDF\]](#) [\[Journal\]](#) [\[Dial\]](#)

Refereed paper. January 26.

Dark Matter In Extreme Astrophysical Environments

Baryakhtar, Masha and others

[\[Abstract\]](#) [\[PDF\]](#)

January 26.

Preprints

Collaboration papers:

- All collaboration papers are automatically added to DIAL
- Only add papers with a relevant personal contribution to the CP3 preprints system

Notes:

- To be automatically added to DIAL, preprints in the CP3 system need an **arxiv reference**
- If you used the computing cluster for a paper, please thank the UCLouvain computing center team (CISM)

Agenda

- We use a local installation of CERN's Indico for all events:
agenda.irmp.ucl.ac.be
- Upcoming events are shown on the public website
- All CP3 members are allowed to create events in relevant categories. Open an issue if you need more permissions.
- Rooms should be booked there
- You can (and probably should) get the agenda in your personal calendar tool using:
cp3.irmp.ucl.ac.be/agenda/merged_ics/CP3

Gitlab

cp3-git.irmp.ucl.ac.be offers a development environment for your projects:

- versioning
- issue tracking
- wiki
- fine-grained permissions
- continuous integration

Versioning is **strongly recommended** for all papers and code projects.

You can also use gitlab for just one of its features, for instance if you need a wiki page for documentation.

Mattermost

Mattermost is an open-source slack clone

It offers the usual features:

- group chat
- organisation in teams and channels
- searchable history
- file, image and links sharing

Access it on cp3-mm.irmp.ucl.ac.be (cp3 credentials)

Other CP3 tools

- Working groups: automatic mailing lists
- Building map: find people in tower E
- Send mails to CP3 people by category: PhD, PostDoc, etc...

There's a ton more tools for academics but it's not the point of this talk.

UCLouvain tools

The Office 365 ecosystem

As a UCLouvain member you have access to the whole system:

- shared agenda
- cloud storage (onedrive, 1TB)
- online office tools (word, excell, ...)
- online forms
- notes
- collaborative tools:
 - 'Planner' for task management
 - 'Teams' for chat and videoconference

Pick the ones that work for you.

Storage and transfer

You have a 20GB general-purpose, backed-up space:

intranet.uclouvain.be/fr/myucl/services-informatiques/service-fichier-personnel.html

Groups can also make a request for a shared storage space

intranet.uclouvain.be/fr/myucl/services-informatiques/service-fichier-groupe.html

To transfer very large files (→100GB), you can use this:

filesender.belnet.be

Computing cluster

The cluster

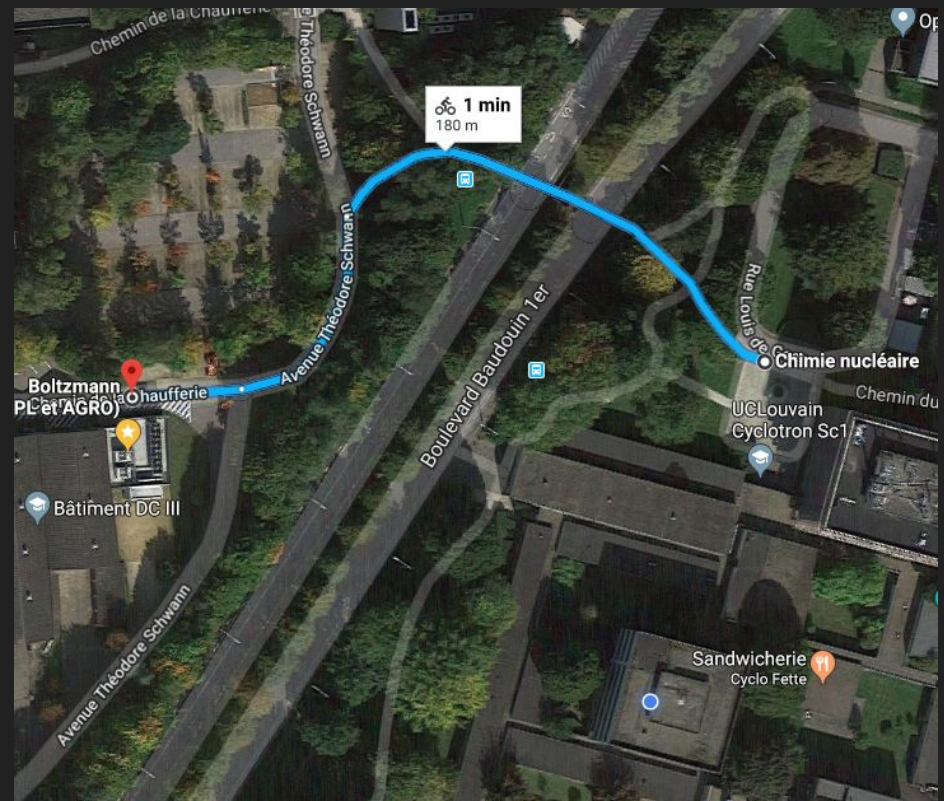
Located in the DC3 building

CP3 Worker nodes:

- 10 racks
- ~100 machines
- 3500 job slots
- 3.2 GB RAM/slot on average (2GB to 4GB)

Network:

- 1Gb/s connection from worker nodes
- 10 Gb/s connection from storage nodes
- 10 Gb/s connection to the GEANT network



Storage

space	total size	security level	usage
GIT	-	versioning + backup	code + papers
home	50 GB quota	duplicated	workdirs & final results
user	160 TB	duplicated	critical data
scratch	29 TB	RAID6	temporary data
stageout	3.5 PB (shared)	RAID6	stageout
cms data	3.5 PB (shared)	RAID6	phedex data

CECI clusters

You can also access the CECI clusters:

- 5 clusters in Wallonia: Louvain, Brussels, Liège, Namur, Mons
- Shared file system between clusters, 10Gb/s interconnect
- Clusters with different focus:
 - Mons & Louvain: GPU accelerators
 - Namur: openMP jobs (many cores/CPU)
 - Louvain: massively parallel jobs (omnipath)
 - ...

See: <http://www.cec-hpc.be/clusters.html>

Account

CECI account:

- request from www.cec-hpc.be
- requires a UCLouvain email
- needs to be renewed every year
- notification 1 month before expiration

External collaborators:

- can get guest status
- a UCLouvain academic has to register them
- needs to be renewed every 6 months

Access

Our user interface:

- `ingrid-ui1.cism.ucl.ac.be` (CentOS 7)

From outside the UCLouvain network, go through `gwceci.cism.ucl.ac.be` (see wiki for help)

Use these to:

- prepare runs, compile, look at plots, etc...

Do not use for:

- long/computer intensive jobs

Documentation

CP3-related topics are in our wiki:

- [Getting started](#)
- [Job submission](#)

Louvain-specific topics are in the CISM doc:

- www.cism.ucl.ac.be/doc

More general topics can be found in the CECI documentation:

- support.cec-hpc.be/doc

CECI training program

Set of training sessions given each year to help you use the computing cluster and learn new tools (1 or 2 days per session).

- HPC basics
 - Introduction, SSH, Linux, VIM
 - software modules, SLURM, checkpointing
- Programming
 - Intro to Fortran, C, C++, Python, Julia, R, Matlab
 - Programming for a cluster
 - Debugging and profiling
- Parallel computing (MPI, OpenMP, GPUs)
- Data management and Open Data
- Data science
 - Intro to Tensorflow
 - Singularity
 - Intro to industry-standard big data tools

CECI training program

Training sessions start in November and end in March

Next session: data science on March 14 (<https://indico.cism.ucl.ac.be/event/129/>)

Full program:

www.ceci-hpc.be/training.html

All sessions, and much more, are available on the CECI youtube channel:

www.youtube.com/channel/UCaFutwpSbKmWOxDwEqUpSqA

CP3 Software

Preinstalled software:

- Root 6.02 to 6.12
- Python 2.7 and 3.7
- Mathematica
- Matlab
- Geant
- ... And many scientific packages provided by the CISM

In addition, CMS, GRID, NA62 and VIRGO softwares are provided by the cvmfs system

Software modules

To get the list of software versions use:

```
module avail
```

You can then load the version you need with:

```
module load my_software/my_version
```

To use CP3 modules in your SLURM jobs, you need to do

```
module load cp3
```

before loading other modules. You can also load the modules before sending the jobs.

Job management

SLURM is the job management system for our cluster

The cluster has the following partitions:

- cp3 (3500 slots) : main partition, max duration 5 days
- Def (1000 slots):
 - shared with the rest of UCLouvain
 - lower priority
- gpu: use the powerful V100 CISM gpus

In addition, 200 cores of the CP3 partition are accessible only to jobs **shorter than 8 hours**.

Recommendations

The ideal job:

- lasts a few hours
- uses < 3GB of memory per slot
- only writes to the local filesystem during run
- has been tested in smaller scale

(We know it's not always possible)

- To get the best possible experience, remember to set:
 - memory per job with `--mem-per-cpu`
 - job max duration with `--time`

Disk monitoring

Disk usage monitoring: CP3 → computing → my disk usage



If you are in the top ten for some space, you should get email reminders twice a month.

CP3 SLURM utils

A package to help manage your slurm jobs. Load it with:

```
module load slurm/slurm_utils
```

You can get a template config file including documentation:

```
slurm_submit --get-config-template
```

Submitting:

```
slurm_submit -s config_file
```

Resubmitting failed jobs:

```
slurm_resubmit -j array_id -t FAILED
```

SLURM Cheatsheet

`squeue`: see the jobs in queue

- all cp3 jobs: `squeue -l -p cp3`
- running/pending: `squeue -l -t R/PD -u username`

`sinfo`: cluster status

- occupancy: `sinfo -o %C -p cp3,Def`

`scontrol/sacct`: details and management

- job details: `scontrol show job xxx`
- finished job details: `sacct -j jobid <--long>`
- edit job: `scontrol update jobid=xxx time=XXX`

The end