Preparing for the MicrOMEGAs hands-on session

In this session we will learn how to use some of the functionalities of the micrOMEGAs dark matter code. After a (hopefully!) short introduction, we will go step-by-step through the process of importing a simple model in micrOMEGAs and using the code to study some of its DM-related phenomenological aspects.

No prior knowledge of the code will be assumed and some of the required material will be provided in order to optimize the session. We will, however, draw notions from other talks/tutorials in the workshop.

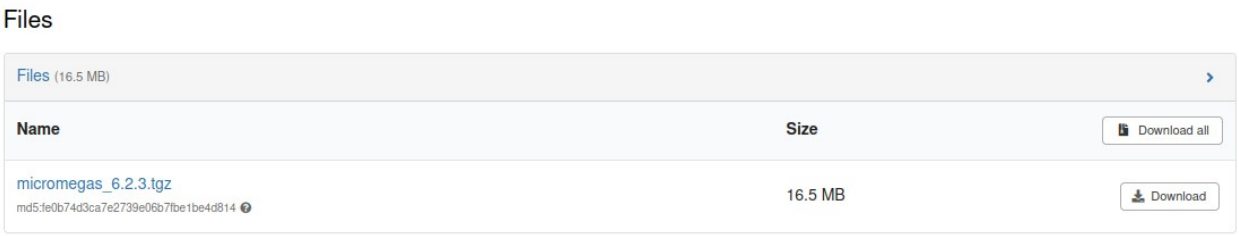
In order to prepare for this session please go through the following steps *beforehand*:

1) Download MicrOMEGAs. The code can be found in

https://lapth.cnrs.fr/micromegas/

under “Download and Install”. You will be redirected to zenodo:

https://zenodo.org/records/14978911



NB: This screenshot was taken when 6.2.3 was the latest version

2) Unpack (*e.g.* through: tar -xvzf micromegas_6.2.4.tgz). This should create the folder micromegas_6.2.4/

3) Go to the main directory (~/micromegas_6.2.4/) and build the code by executing

./make

A lot of output will appear on your terminal, including warnings. This is (fairly) normal. Additional information concerning compilation can be found in Section 3.2 if the manual, which is located in the

~/man/

folder.

Please note that since every system architecture may differ, it won't be possible to troubleshoot all compilation issues during the lecture, so please do take the time to go through this process beforehand.

4) In order to test whether the code has been successfully installed you can, *e.g.*,

```
cd IDM/
```

then type

```
make main=main.c
```

and then

```
./main data0.par
```

If things have been compiled as they should, the code will compute different things (some of which we'll discuss during the tutorial) and you'll see some output which ends with

```
===== Direct detection exclusion:======
Excluded by LZ5Tmedian  100.0%
```

Note that this main file includes numerous functionalities of MicrOMEGAs, some of them relying on external packages. Given the variability of system architectures, some of them may bug upon first compilation. You are encouraged to try and resolve *e.g.* issues with missing dependencies and packages, but if all your compilation issues concern external software don't worry too much. During this tutorial we'll essentially be using "internal" MO routines.

NB: For the history, the ~/IDM/ folder contains an implementation of the Inert Doublet Model of dark matter and you just asked MicrOMEGAs to compute different things for a specific IDM benchmark.

5) Download the file:

```
SingletScalarDM.tar.gz
```

No need to do anything with this for the moment, we'll be using it during the session.

NB: In time, another file called mymain.c will also be uploaded, which will also be used during the tutorial.

For any questions before or after the session please send an email to: andreas.goudelis@clermont.in2p3.fr .

Kind regards,
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