

BPL_TEST2_Batch script with FMPy ver 0.3.15

The key library FMPy ver 0.3.15 is installed.

After the installation a small application BPL_YEAST_COB_Batch is loaded and run.
You can continue with this example if you like.

```
In [ ]: !lsb_release -a # Actual VM Ubuntu version used by Google
```

```
No LSB modules are available.  
Distributor ID: Ubuntu  
Description:    Ubuntu 20.04.5 LTS  
Release:        20.04  
Codename:       focal
```

```
In [ ]: %env PYTHONPATH=
```

```
env: PYTHONPATH=
```

```
In [ ]: !wget https://repo.anaconda.com/miniconda/Miniconda3-py39_23.1.0-1-Linux-  
!chmod +x Miniconda3-py39_23.1.0-1-Linux-x86_64.sh  
!bash ./Miniconda3-py39_23.1.0-1-Linux-x86_64.sh -b -f -p /usr/local  
import sys  
sys.path.append('/usr/local/lib/python3.9/site-packages/')
```

```
--2023-05-31 09:41:41-- https://repo.anaconda.com/miniconda/Miniconda3-
py39_23.1.0-1-Linux-x86_64.sh
Resolving repo.anaconda.com (repo.anaconda.com)... 104.16.130.3, 104.16.
131.3, 2606:4700::6810:8203, ...
Connecting to repo.anaconda.com (repo.anaconda.com)|104.16.130.3|:443...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 69888122 (67M) [application/x-sh]
Saving to: 'Miniconda3-py39_23.1.0-1-Linux-x86_64.sh'
```

```
Miniconda3-py39_23. 100%[=====>] 66.65M 128MB/s in
0.5s
```

```
2023-05-31 09:41:42 (128 MB/s) - 'Miniconda3-py39_23.1.0-1-Linux-x86_64.sh' saved [69888122/69888122]
```

```
PREFIX=/usr/local
Unpacking payload ...
```

Installing base environment...

Downloading and Extracting Packages

Downloading and Extracting Packages

```
Preparing transaction: - 00\ 00| 00/ 00- 00\ 00| 00done
Executing transaction: - 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00-
00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00|
00/ 00- 00\ 00done
installation finished.
```

```
In [ ]: !conda update -n base -c defaults conda --yes
```

```
Collecting package metadata (current_repodata.json): - 00\ 00| 00/ 00-
00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00|
00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00-
00\ 00| 00/ 00- 00done
Solving environment: | 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00|
00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00-
00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00done
```

Package Plan

```
environment location: /usr/local

added / updated specs:
- conda
```

The following packages will be downloaded:

package	build	
boltons-23.0.0	py39h06a4308_0	426 KB
certifi-2023.5.7	py39h06a4308_0	152 KB
conda-23.5.0	py39h06a4308_0	1023 KB
conda-package-handling-2.1.0	py39h06a4308_0	268 KB
conda-package-streaming-0.8.0	py39h06a4308_0	27 KB
cryptography-39.0.1	py39h9ce1e76_0	1.4 MB
jsonpatch-1.32	pyhd3eb1b0_0	15 KB
jsonpointer-2.1	pyhd3eb1b0_0	9 KB
libffi-3.4.4	h6a678d5_0	142 KB
openssl-1.1.1t	h7f8727e_0	3.7 MB
packaging-23.0	py39h06a4308_0	68 KB
pyopenssl-23.0.0	py39h06a4308_0	96 KB
requests-2.29.0	py39h06a4308_0	96 KB
sqlite-3.41.2	h5eee18b_0	1.2 MB
tqdm-4.65.0	py39hb070fc8_0	131 KB
tzdata-2023c	h04d1e81_0	116 KB
urllib3-1.26.15	py39h06a4308_0	197 KB
xz-5.4.2	h5eee18b_0	642 KB
zstandard-0.19.0	py39h5eee18b_0	474 KB
Total:		10.1 MB

The following NEW packages will be INSTALLED:

```
boltons          pkgs/main/linux-64::boltons-23.0.0-py39h06a4308_0
jsonpatch        pkgs/main/noarch::jsonpatch-1.32-pyhd3eb1b0_0
jsonpointer       pkgs/main/noarch::jsonpointer-2.1-pyhd3eb1b0_0
packaging         pkgs/main/linux-64::packaging-23.0-py39h06a4308_0
```

The following packages will be UPDATED:

```
certifi          2022.12.7-py39h06a4308_0 --> 2023.5.7
-py39h06a4308_0
conda            23.1.0-py39h06a4308_0 --> 23.5.0-p
y39h06a4308_0
conda-package-han~ 2.0.2-py39h06a4308_0 --> 2.1.0-py
39h06a4308_0
conda-package-str~ 0.7.0-py39h06a4308_0 --> 0.8.0-py
39h06a4308_0
cryptography     38.0.4-py39h9ce1e76_0 --> 39.0.1-p
```

```
y39h9ce1e76_0
  libffi                                3.4.2-h6a678d5_6 --> 3.4.4-h6
a678d5_0
  openssl                                1.1.1s-h7f8727e_0 --> 1.1.1t-h
7f8727e_0
  pyopenssl                             pkgs/main/noarch::pyopenssl-22.0.0-py~ --> pkgs/main/linux-64::pyopenssl-23.0.0-py39h06a4308_0
requests                                2.28.1-py39h06a4308_0 --> 2.29.0-p
y39h06a4308_0
  sqlite                                 3.40.1-h5082296_0 --> 3.41.2-h
5ee18b_0
  tqdm                                  4.64.1-py39h06a4308_0 --> 4.65.0-p
y39hb070fc8_0
  tzdata                                2022g-h04d1e81_0 --> 2023c-h0
4d1e81_0
  urllib3                               1.26.14-py39h06a4308_0 --> 1.26.15-
py39h06a4308_0
  xz                                    5.2.10-h5ee18b_1 --> 5.4.2-h5
ee18b_0
  zstandard                             0.18.0-py39h5ee18b_0 --> 0.19.0-p
y39h5ee18b_0
```

Downloading and Extracting Packages

xz-5.4.2	642 KB	:	0% 0/1 [00:00<?, ?it/s]
tqdm-4.65.0	131 KB	:	0% 0/1 [00:00<?, ?it/s]
openssl-1.1.1t	3.7 MB	:	0% 0/1 [00:00<?, ?it/s]
libffi-3.4.4	142 KB	:	0% 0/1 [00:00<?, ?it/s]
packaging-23.0	68 KB	:	0% 0/1 [00:00<?, ?it/s]
urllib3-1.26.15	197 KB	:	0% 0/1 [00:00<?, ?it/s]
jsonpointer-2.1	9 KB	:	0% 0/1 [00:00<?, ?it/s]
pyopenssl-23.0.0	96 KB	:	0% 0/1 [00:00<?, ?it/s]

sqlite-3.41.2	1.2 MB	:	0% 0/1 [00:00<?, ?it/s]
jsonpatch-1.32	15 KB	:	0% 0/1 [00:00<?, ?it/s]
cryptography-39.0.1	1.4 MB	:	0% 0/1 [00:00<?, ?it/s]
conda-package-stream	27 KB	:	0% 0/1 [00:00<?, ?it/s]
zstandard-0.19.0	474 KB	:	0% 0/1 [00:00<?, ?it/s]
boltons-23.0.0	426 KB	:	0% 0/1 [00:00<?, ?it/s]

conda-package-handli | 268 KB | : 0% 0/1 [00:00<?, ?it/s]

requests-2.29.0 | 96 KB | : 0% 0/1 [00:00<?, ?it/s]

conda-23.5.0 | 1023 KB | : 0% 0/1 [00:00<?, ?it/s]

certifi-2023.5.7 | 152 KB | : 0% 0/1 [00:00<?, ?it/s]

tzdata-2023c	116 KB	:	0% 0/1 [00:00<?, ?it/s]
openssl-1.1.1t	3.7 MB	:	0% 0.004179907462400222/1 [00:00<
00:28, 28.32s/it]			
xz-5.4.2	642 KB	:	2% 0.024932699667797344/1 [00:00<
00:05, 5.89s/it]			
libffi-3.4.4	142 KB	:	11% 0.11271016207589224/1 [00:00<0
0:01, 1.19s/it]			
packaging-23.0	68 KB	:	24% 0.23654082148271133/1 [00:00<0
0:00, 1.65it/s]			
urllib3-1.26.15	197 KB	:	8% 0.08116114331005102/1 [00:00<0
0:02, 2.33s/it]			
openssl-1.1.1t	3.7 MB	:	28% 0.2842337074432151/1 [00:00<0
0:00, 1.50it/s]			
jsonpointer-2.1	9 KB	:	100% 1.0/1 [00:00<00:00, 4.43it/s]
pyopenssl-23.0.0	96 KB	:	17% 0.16662429191794892/1 [00:00<0
0:01, 1.39s/it]			

sqlite-3.41.2 | 1.2 MB | : 1% 0.013323043970761513/1 [00:00<00:19, 19.67s/it]

cryptography-39.0.1 | 1.4 MB | : 1% 0.011060950671967607/1 [00:00<00:25, 25.42s/it]

conda-package-stream | 27 KB | : 58% 0.582355868344352/1 [00:00<00:00, 2.04it/s]

openssl-1.1.1t | 3.7 MB | : 56% 0.56428750742403/1 [00:00<00:00, 2.06it/s]

jsonpatch-1.32 | 15 KB | : 100% 1.0/1 [00:00<00:00, 3.25it/s]

zstandard-0.19.0 | 474 KB | : 3% 0.03373734128994263/1 [00:00<00:10, 10.56s/it]

boltons-23.0.0 | 426 KB | : 4% 0.03755093808587393/1 [00:00<0
0:09, 9.59s/it]

cryptography-39.0.1 | 1.4 MB | : 66% 0.6636570403180564/1 [00:00<0
0:00, 2.10it/s]

openssl-1.1.1t | 3.7 MB | : 84% 0.8443413074048448/1 [00:00<0
0:00, 2.30it/s]

conda-package-handli | 268 KB | : 6% 0.059598553687442254/1 [00:00<
00:06, 6.78s/it]

packaging-23.0 | 68 KB | : 100% 1.0/1 [00:00<00:00, 2.16it/s]

packaging-23.0 | 68 KB | : 100% 1.0/1 [00:00<00:00, 2.16it/s]

certifi-2023.5.7 | 152 KB | : 11% 0.10549292056480951/1 [00:00<0
0:03, 4.44s/it]

conda-23.5.0 | 1023 KB | : 2% 0.015634184510859194/1 [00:00<00:29, 30.44s/it]

requests-2.29.0 | 96 KB | : 17% 0.16670227811523866/1 [00:00<00:02, 2.87s/it]

tzdata-2023c | 116 KB | : 14% 0.13846257859509162/1 [00:00<00:03, 3.52s/it]
tqdm-4.65.0 | 131 KB | : 100% 1.0/1 [00:00<00:00, 1.71it/s]
tqdm-4.65.0 | 131 KB | : 100% 1.0/1 [00:00<00:00, 1.71it/s]

libffi-3.4.4 | 142 KB | : 100% 1.0/1 [00:00<00:00, 1.14it/s]

libffi-3.4.4 | 142 KB | : 100% 1.0/1 [00:00<00:00, 1.14it/s]

urllib3-1.26.15	197 KB	: 100% 1.0/1 [00:01<00:00, 1.02it/s]
xz-5.4.2	642 KB	: 100% 1.0/1 [00:01<00:00, 1.02s/it]
jsonpointer-2.1	9 KB	: 100% 1.0/1 [00:01<00:00, 4.43it/s]
pyopenssl-23.0.0	96 KB	: 100% 1.0/1 [00:01<00:00, 1.07s/it]
pyopenssl-23.0.0	96 KB	: 100% 1.0/1 [00:01<00:00, 1.07s/it]
conda-package-stream	27 KB	: 100% 1.0/1 [00:01<00:00, 1.24s/it]
conda-package-stream	27 KB	: 100% 1.0/1 [00:01<00:00, 1.24s/it]

jsonpatch-1.32 | 15 KB | : 100% 1.0/1 [00:01<00:00, 3.25it/s]

sqlite-3.41.2 | 1.2 MB | : 100% 1.0/1 [00:01<00:00, 1.14s/it]

sqlite-3.41.2 | 1.2 MB | : 100% 1.0/1 [00:01<00:00, 1.14s/it]

zstandard-0.19.0 | 474 KB | : 100% 1.0/1 [00:01<00:00, 1.19s/it]

zstandard-0.19.0 | 474 KB | : 100% 1.0/1 [00:01<00:00, 1.19s/it]

boltons-23.0.0 | 426 KB | : 100% 1.0/1 [00:01<00:00, 1.21s/it]

boltons-23.0.0 | 426 KB | : 100% 1.0/1 [00:01<00:00, 1.21s/it]

conda-package-handli | 268 KB | : 100% 1.0/1 [00:01<00:00, 1.28s/it]

conda-package-handli | 268 KB | : 100% 1.0/1 [00:01<00:00, 1.28s/it]

cryptography-39.0.1 | 1.4 MB | : 100% 1.0/1 [00:01<00:00, 1.93s/it]

cryptography-39.0.1 | 1.4 MB | : 100% 1.0/1 [00:01<00:00, 1.93s/it]

openssl-1.1.1t | 3.7 MB | : 100% 1.0/1 [00:01<00:00, 2.30it/s]

certifi-2023.5.7 | 152 KB | : 100% 1.0/1 [00:01<00:00, 1.69s/it]

certifi-2023.5.7 | 152 KB | : 100% 1.0/1 [00:01<00:00, 1.69s/it]

requests-2.29.0 | 96 KB | : 100% 1.0/1 [00:01<00:00, 1.75s/it]

requests-2.29.0 | 96 KB | : 100% 1.0/1 [00:01<00:00, 1.75s/it]

tzdata-2023c | 116 KB | : 100% 1.0/1 [00:02<00:00, 2.37s/it]

tzdata-2023c | 116 KB | : 100% 1.0/1 [00:02<00:00, 2.37s/it]

conda-23.5.0 | 1023 KB | : 100% 1.0/1 [00:02<00:00, 2.33s/it]


```
Preparing transaction: / - done
```

```
Verifying transaction: | / - \ | / - done
```

```
Executing transaction: | / - \ | / - \ | / - \ d  
one
```

```
In [ ]: !conda --version  
!python --version
```

```
conda 23.5.0  
Python 3.9.16
```

```
In [ ]: !conda install -c conda-forge fmpy --yes # Install the key package
```

[illegible]

package	build		
attrs-23.1.0	pyh71513ae_1	54 KB	conda-
blas-1.0	mk1	6 KB	
blinker-1.6.2	pyhd8ed1ab_0	18 KB	conda-
bokeh-2.4.3	pyhd8ed1ab_3	13.3 MB	conda-
bottleneck-1.3.5	py39h7deecbd_0	115 KB	
ca-certificates-2023.5.7	hbcca054_0	145 KB	conda-
certifi-2023.5.7	pyhd8ed1ab_0	149 KB	conda-

forge				
click-8.1.3		unix_pyhd8ed1ab_2	74 KB	conda-
forge				
cloudpickle-2.2.1		pyhd8ed1ab_0	27 KB	conda-
forge				
conda-23.5.0		py39hf3d152e_1	994 KB	conda-
forge				
cycler-0.11.0		pyhd8ed1ab_0	10 KB	conda-
forge				
cytoolz-0.12.0		py39h5eee18b_0	373 KB	
dash-2.9.3		pyhd8ed1ab_2	6.1 MB	conda-
forge				
dash-bootstrap-components-1.4.1		pyhd8ed1ab_0	116 KB	co
nda-forge				
dask-2023.4.1		py39h06a4308_0	6 KB	
dask-core-2023.4.1		py39h06a4308_0	2.1 MB	
dbus-1.13.18		hb2f20db_0	504 KB	
distributed-2023.4.1		py39h06a4308_0	1.2 MB	
expat-2.2.10		h9c3ff4c_0	164 KB	conda-
forge				
flask-2.3.2		pyhd8ed1ab_0	78 KB	conda-
forge				
fmpy-0.3.15		h13ae965_0	10 KB	conda-
forge				
fmpy-base-0.3.15		py39hf3d152e_0	5.9 MB	conda-
forge				
fontconfig-2.14.1		hef1e5e3_0	284 KB	
freetype-2.10.4		h0708190_1	890 KB	conda-
forge				
fsspec-2023.5.0		pyh1a96a4e_0	113 KB	conda-
forge				
giflib-5.2.1		h36c2ea0_2	77 KB	conda-
forge				
glib-2.69.1		he621ea3_2	1.9 MB	
gst-plugins-base-1.14.1		h6a678d5_1	2.2 MB	
gststreamer-1.14.1		h5eee18b_1	1.7 MB	
icu-58.2		hf484d3e_1000	22.6 MB	conda-
forge				
importlib-metadata-6.6.0		pyha770c72_0	25 KB	conda-
forge				
importlib_resources-5.12.0		pyhd8ed1ab_0	30 KB	conda-
forge				
intel-openmp-2021.4.0		h06a4308_3561	4.2 MB	
itsdangerous-2.1.2		pyhd8ed1ab_0	16 KB	conda-
forge				
jinja2-3.1.2		pyhd8ed1ab_1	99 KB	conda-
forge				
jpeg-9e		h166bdaf_1	268 KB	conda-
forge				
jsonschema-4.17.3		pyhd8ed1ab_0	69 KB	conda-
forge				
jupyter_core-5.3.0		py39hf3d152e_0	88 KB	conda-
forge				
keyutils-1.6.1		h166bdaf_0	115 KB	conda-
forge				
kiwisolver-1.4.4		py39h6a678d5_0	76 KB	
krb5-1.19.3		h3790be6_0	1.4 MB	conda-
forge				
lark-parser-0.12.0		pyhd8ed1ab_0	78 KB	conda-
forge				

lcms2-2.12		h3be6417_0	312 KB	
lerc-3.0		h295c915_0	196 KB	
libclang-10.0.1		default_hb85057a_2	10.8 MB	
libdeflate-1.17		h5eee18b_0	69 KB	
libedit-3.1.20191231		he28a2e2_2	121 KB	conda-
forge				
libevent-2.1.12		h8f2d780_0	425 KB	
liblvm10-10.0.1		he513fc3_3	26.4 MB	conda-
forge				
libpng-1.6.39		h5eee18b_0	304 KB	
libpq-12.9		h16c4e8d_3	2.1 MB	
libtiff-4.5.0		h6a678d5_2	479 KB	
libwebp-1.2.4		h11a3e52_1	86 KB	
libwebp-base-1.2.4		h5eee18b_1	376 KB	
libxcb-1.15		h7f8727e_0	505 KB	
libxkbcommon-1.0.1		hfa300c1_0	483 KB	
libxml2-2.9.14		h74e7548_0	718 KB	
libxslt-1.1.35		h4e12654_0	453 KB	
loket-1.0.0		pyhd8ed1ab_0	8 KB	conda-
forge				
lxml-4.9.1		py39h1edc446_0	1.3 MB	
lz4-c-1.9.3		h9c3ff4c_1	179 KB	conda-
forge				
markupsafe-2.1.1		py39h7f8727e_0	21 KB	
matplotlib-base-3.4.3		py39h2fa2bec_2	7.3 MB	conda-
forge				
mkl-2021.4.0		h06a4308_640	142.6 MB	
mkl-service-2.4.0		py39h7e14d7c_0	61 KB	conda-
forge				
mkl_fft-1.3.1		py39hd3c417c_0	182 KB	
mkl_random-1.2.2		py39hde0f152_0	379 KB	conda-
forge				
msgpack-python-1.0.3		py39hd09550d_0	83 KB	
nbformat-5.8.0		pyhd8ed1ab_0	98 KB	conda-
forge				
nspr-4.33		h295c915_0	222 KB	
nss-3.74		h0370c37_0	1.9 MB	
numexpr-2.8.4		py39he184ba9_0	133 KB	
numpy-1.24.3		py39h14f4228_0	11 KB	
numpy-base-1.24.3		py39h31eccc5_0	6.9 MB	
pandas-1.5.3		py39h417a72b_0	12.0 MB	
partd-1.4.0		pyhd8ed1ab_0	20 KB	conda-
forge				
pathlib-1.0.1		py39hf3d152e_7	5 KB	conda-
forge				
pcr-8.45		h9c3ff4c_0	253 KB	conda-
forge				
pillow-9.4.0		py39h6a678d5_0	727 KB	
pkgutil-resolve-name-1.3.10		pyhd8ed1ab_0	9 KB	conda-
forge				
platformdirs-3.5.1		pyhd8ed1ab_0	18 KB	conda-
forge				
plotly-5.14.1		pyhd8ed1ab_0	4.9 MB	conda-
forge				
ply-3.11		py_1	44 KB	conda-
forge				
psutil-5.9.0		py39h5eee18b_0	330 KB	
pyparsing-3.0.9		pyhd8ed1ab_0	79 KB	conda-
forge				
pyqt-5.15.7		py39h6a678d5_1	5.1 MB	

pyqt5-sip-12.11.0		py39h6a678d5_1	87 KB	
pyqtgraph-0.13.3		pyhd8ed1ab_0	670 KB	conda-
forge				
pyqtwebengine-5.15.7		py39h6a678d5_1	159 KB	
pyrsistent-0.18.0		py39heee7806_0	94 KB	
python-dateutil-2.8.2		pyhd8ed1ab_0	240 KB	conda-
forge				
python-fastjsonschema-2.17.1		pyhd8ed1ab_0	220 KB	conda
-forge				
python_abi-3.9		2_cp39	4 KB	conda-
forge				
pytz-2023.3		pyhd8ed1ab_0	182 KB	conda-
forge				
pyyaml-6.0		py39hb9d737c_4	178 KB	conda-
forge				
qt-main-5.15.2		h327a75a_7	45.1 MB	
qt-webengine-5.15.9		hd2b0992_4	47.1 MB	
qtwebkit-5.212		h4eab89a_4	14.3 MB	
sip-6.6.2		py39h6a678d5_0	423 KB	
sortedcontainers-2.4.0		pyhd8ed1ab_0	26 KB	conda-
forge				
tblib-1.7.0		pyhd8ed1ab_0	15 KB	conda-
forge				
tenacity-8.2.2		pyhd8ed1ab_0	22 KB	conda-
forge				
toml-0.10.2		pyhd8ed1ab_0	18 KB	conda-
forge				
tornado-6.1		py39hb9d737c_3	649 KB	conda-
forge				
traitlets-5.9.0		pyhd8ed1ab_0	96 KB	conda-
forge				
typing-extensions-4.6.2		hd8ed1ab_0	10 KB	conda-
forge				
typing_extensions-4.6.2		pyha770c72_0	34 KB	conda-
forge				
werkzeug-2.3.4		pyhd8ed1ab_0	248 KB	conda-
forge				
yaml-0.2.5		h7f98852_2	87 KB	conda-
forge				
zict-3.0.0		pyhd8ed1ab_0	35 KB	conda-
forge				
zipp-3.15.0		pyhd8ed1ab_0	17 KB	conda-
forge				
zstd-1.5.2		ha4553b6_0	488 KB	

Total:			406.2 MB	

The following NEW packages will be INSTALLED:

attrs	conda-forge/noarch::attrs-23.1.0-pyh71513ae_1
blas	pkgs/main/linux-64::blas-1.0-mkl
blinker	conda-forge/noarch::blinker-1.6.2-pyhd8ed1ab_0
bokeh	conda-forge/noarch::bokeh-2.4.3-pyhd8ed1ab_3
bottleneck	pkgs/main/linux-64::bottleneck-1.3.5-py39h7deecbd_0
click	conda-forge/noarch::click-8.1.3-unix_pyhd8ed1ab_2
cloudpickle	conda-forge/noarch::cloudpickle-2.2.1-pyhd8ed1ab_0
cycler	conda-forge/noarch::cycler-0.11.0-pyhd8ed1ab_0
cytoolz	pkgs/main/linux-64::cytoolz-0.12.0-py39h5eeel8b_0
dash	conda-forge/noarch::dash-2.9.3-pyhd8ed1ab_2
dash-bootstrap-co~	conda-forge/noarch::dash-bootstrap-components-1.4.1


```

-pyhd8edlab_0
  dask pkgs/main/linux-64::dask-2023.4.1-py39h06a4308_0
  dask-core pkgs/main/linux-64::dask-core-2023.4.1-py39h06a4308
_0
  dbus pkgs/main/linux-64::dbus-1.13.18-hb2f20db_0
  distributed pkgs/main/linux-64::distributed-2023.4.1-py39h06a43
08_0
  expat conda-forge/linux-64::expat-2.2.10-h9c3ff4c_0
  flask conda-forge/noarch::flask-2.3.2-pyhd8edlab_0
  fmpy conda-forge/noarch::fmpy-0.3.15-h13ae965_0
  fmpy-base conda-forge/linux-64::fmpy-base-0.3.15-py39hf3d152e
_0
  fontconfig pkgs/main/linux-64::fontconfig-2.14.1-hef1e5e3_0
  freetype conda-forge/linux-64::freetype-2.10.4-h0708190_1
  fsspec conda-forge/noarch::fsspec-2023.5.0-pyh1a96a4e_0
  giflib conda-forge/linux-64::giflib-5.2.1-h36c2ea0_2
  glib pkgs/main/linux-64::glib-2.69.1-he621ea3_2
  gst-plugins-base pkgs/main/linux-64::gst-plugins-base-1.14.1-h6a678d
5_1
  gstreamer pkgs/main/linux-64::gstreamer-1.14.1-h5eee18b_1
  icu conda-forge/linux-64::icu-58.2-hf484d3e_1000
  importlib-metadata conda-forge/noarch::importlib-metadata-6.6.0-pyha77
0c72_0
  importlib_resources conda-forge/noarch::importlib_resources-5.12.0-pyhd
8edlab_0
  intel-openmp pkgs/main/linux-64::intel-openmp-2021.4.0-h06a4308_
3561
  itsdangerous conda-forge/noarch::itsdangerous-2.1.2-pyhd8edlab_0
  jinja2 conda-forge/noarch::jinja2-3.1.2-pyhd8edlab_1
  jpeg conda-forge/linux-64::jpeg-9e-h166bdaf_1
  jsonschema conda-forge/noarch::jsonschema-4.17.3-pyhd8edlab_0
  jupyter_core conda-forge/linux-64::jupyter_core-5.3.0-py39hf3d15
2e_0
  keyutils conda-forge/linux-64::keyutils-1.6.1-h166bdaf_0
  kiwisolver pkgs/main/linux-64::kiwisolver-1.4.4-py39h6a678d5_0
  krb5 conda-forge/linux-64::krb5-1.19.3-h3790be6_0
  lark-parser conda-forge/noarch::lark-parser-0.12.0-pyhd8edlab_0
  lcms2 pkgs/main/linux-64::lcms2-2.12-h3be6417_0
  lerc pkgs/main/linux-64::lerc-3.0-h295c915_0
  libclang pkgs/main/linux-64::libclang-10.0.1-default_hb85057
a_2
  libdeflate pkgs/main/linux-64::libdeflate-1.17-h5eee18b_0
  libedit conda-forge/linux-64::libedit-3.1.20191231-he28a2e2
_2
  libevent pkgs/main/linux-64::libevent-2.1.12-h8f2d780_0
  libllvm10 conda-forge/linux-64::libllvm10-10.0.1-he513fc3_3
  libpng pkgs/main/linux-64::libpng-1.6.39-h5eee18b_0
  libpq pkgs/main/linux-64::libpq-12.9-h16c4e8d_3
  libtiff pkgs/main/linux-64::libtiff-4.5.0-h6a678d5_2
  libwebp pkgs/main/linux-64::libwebp-1.2.4-h11a3e52_1
  libwebp-base pkgs/main/linux-64::libwebp-base-1.2.4-h5eee18b_1
  libxcb pkgs/main/linux-64::libxcb-1.15-h7f8727e_0
  libxcbcommon pkgs/main/linux-64::libxcbcommon-1.0.1-hfa300c1_0
  libxml2 pkgs/main/linux-64::libxml2-2.9.14-h74e7548_0
  libxslt pkgs/main/linux-64::libxslt-1.1.35-h4e12654_0
  locket conda-forge/noarch::locket-1.0.0-pyhd8edlab_0
  lxml pkgs/main/linux-64::lxml-4.9.1-py39h1edc446_0
  lz4-c conda-forge/linux-64::lz4-c-1.9.3-h9c3ff4c_1
  markupsafe pkgs/main/linux-64::markupsafe-2.1.1-py39h7f8727e_0
  matplotlib-base conda-forge/linux-64::matplotlib-base-3.4.3-py39h2f

```

```

a2bec_2
  mkl                pkgs/main/linux-64::mkl-2021.4.0-h06a4308_640
  mkl-service        conda-forge/linux-64::mkl-service-2.4.0-py39h7e14d7
c_0
  mkl_fft            pkgs/main/linux-64::mkl_fft-1.3.1-py39hd3c417c_0
  mkl_random         conda-forge/linux-64::mkl_random-1.2.2-py39hde0f152
_0
  msgpack-python     pkgs/main/linux-64::msgpack-python-1.0.3-py39hd0955
0d_0
  nbformat           conda-forge/noarch::nbformat-5.8.0-pyhd8ed1ab_0
  nspr               pkgs/main/linux-64::nspr-4.33-h295c915_0
  nss                pkgs/main/linux-64::nss-3.74-h0370c37_0
  numexpr            pkgs/main/linux-64::numexpr-2.8.4-py39he184ba9_0
  numpy              pkgs/main/linux-64::numpy-1.24.3-py39h14f4228_0
  numpy-base         pkgs/main/linux-64::numpy-base-1.24.3-py39h31eccc5_
0
  pandas             pkgs/main/linux-64::pandas-1.5.3-py39h417a72b_0
  partd              conda-forge/noarch::partd-1.4.0-pyhd8ed1ab_0
  pathlib            conda-forge/linux-64::pathlib-1.0.1-py39hf3d152e_7
  pcre               conda-forge/linux-64::pcre-8.45-h9c3ff4c_0
  pillow             pkgs/main/linux-64::pillow-9.4.0-py39h6a678d5_0
  pkgutil-resolve-n~ conda-forge/noarch::pkgutil-resolve-name-1.3.10-pyh
d8ed1ab_0
  platformdirs       conda-forge/noarch::platformdirs-3.5.1-pyhd8ed1ab_0
  plotly             conda-forge/noarch::plotly-5.14.1-pyhd8ed1ab_0
  ply                conda-forge/noarch::ply-3.11-py_1
  psutil             pkgs/main/linux-64::psutil-5.9.0-py39h5eee18b_0
  pyparsing          conda-forge/noarch::pyparsing-3.0.9-pyhd8ed1ab_0
  pyqt               pkgs/main/linux-64::pyqt-5.15.7-py39h6a678d5_1
  pyqt5-sip          pkgs/main/linux-64::pyqt5-sip-12.11.0-py39h6a678d5_
1
  pyqtgraph          conda-forge/noarch::pyqtgraph-0.13.3-pyhd8ed1ab_0
  pyqtwebengine       pkgs/main/linux-64::pyqtwebengine-5.15.7-py39h6a678
d5_1
  pyrsistent         pkgs/main/linux-64::pyrsistent-0.18.0-py39heee7806_
0
  python-dateutil     conda-forge/noarch::python-dateutil-2.8.2-pyhd8ed1a
b_0
  python-fastjsonsc~ conda-forge/noarch::python-fastjsonschema-2.17.1-py
hd8ed1ab_0
  python_abi          conda-forge/linux-64::python_abi-3.9-2_cp39
  pytz               conda-forge/noarch::pytz-2023.3-pyhd8ed1ab_0
  pyyaml             conda-forge/linux-64::pyyaml-6.0-py39hb9d737c_4
  qt-main            pkgs/main/linux-64::qt-main-5.15.2-h327a75a_7
  qt-webengine        pkgs/main/linux-64::qt-webengine-5.15.9-hd2b0992_4
  qtwebkit           pkgs/main/linux-64::qtwebkit-5.212-h4eab89a_4
  sip                pkgs/main/linux-64::sip-6.6.2-py39h6a678d5_0
  sortedcontainers    conda-forge/noarch::sortedcontainers-2.4.0-pyhd8ed1
ab_0
  tblib              conda-forge/noarch::tblib-1.7.0-pyhd8ed1ab_0
  tenacity            conda-forge/noarch::tenacity-8.2.2-pyhd8ed1ab_0
  toml               conda-forge/noarch::toml-0.10.2-pyhd8ed1ab_0
  tornado            conda-forge/linux-64::tornado-6.1-py39hb9d737c_3
  traitlets          conda-forge/noarch::traitlets-5.9.0-pyhd8ed1ab_0
  typing-extensions   conda-forge/noarch::typing-extensions-4.6.2-hd8ed1a
b_0
  typing_extensions   conda-forge/noarch::typing_extensions-4.6.2-pyha770
c72_0
  werkzeug           conda-forge/noarch::werkzeug-2.3.4-pyhd8ed1ab_0
  yaml               conda-forge/linux-64::yaml-0.2.5-h7f98852_2

```

```
zict          conda-forge/noarch::zict-3.0.0-pyhd8ed1ab_0
zipp          conda-forge/noarch::zipp-3.15.0-pyhd8ed1ab_0
zstd          pkgs/main/linux-64::zstd-1.5.2-ha4553b6_0
```

The following packages will be UPDATED:

```
ca-certificates  pkgs/main::ca-certificates-2023.01.10~ --> conda-forge::ca-certificates-2023.5.7-hbcca054_0
conda            pkgs/main::conda-23.5.0-py39h06a4308_0 --> conda-forge::conda-23.5.0-py39hf3d152e_1
```

The following packages will be SUPERSEDED by a higher-priority channel:

```
certifi          pkgs/main/linux-64::certifi-2023.5.7-~ --> conda-forge/noarch::certifi-2023.5.7-pyhd8ed1ab_0
```

Downloading and Extracting Packages

lz4-c-1.9.3	179 KB	:	0% 0/1 [00:00<?, ?it/s]
zipp-3.15.0	17 KB	:	0% 0/1 [00:00<?, ?it/s]
pyparsing-3.0.9	79 KB	:	0% 0/1 [00:00<?, ?it/s]
numpy-base-1.24.3	6.9 MB	:	0% 0/1 [00:00<?, ?it/s]
cytoolz-0.12.0	373 KB	:	0% 0/1 [00:00<?, ?it/s]
dbus-1.13.18	504 KB	:	0% 0/1 [00:00<?, ?it/s]
cycler-0.11.0	10 KB	:	0% 0/1 [00:00<?, ?it/s]
certifi-2023.5.7	149 KB	:	0% 0/1 [00:00<?, ?it/s]
pandas-1.5.3	12.0 MB	:	0% 0/1 [00:00<?, ?it/s]

importlib-metadata-6 | 25 KB | : 0% 0/1 [00:00<?, ?it/s]

fmpy-base-0.3.15 | 5.9 MB | : 0% 0/1 [00:00<?, ?it/s]

kiwisolver-1.4.4 | 76 KB | : 0% 0/1 [00:00<?, ?it/s]

lcms2-2.12 | 312 KB | : 0% 0/1 [00:00<?, ?it/s]

conda-23.5.0 | 994 KB | : 0% 0/1 [00:00<?, ?it/s]

libdeflate-1.17 | 69 KB | : 0% 0/1 [00:00<?, ?it/s]

libpq-12.9 | 2.1 MB | : 0% 0/1 [00:00<?, ?it/s]

platformdirs-3.5.1 | 18 KB | : 0% 0/1 [00:00<?, ?it/s]

blas-1.0 | 6 KB | : 0% 0/1 [00:00<?, ?it/s]

importlib_resources- | 30 KB | : 0% 0/1 [00:00<?, ?it/s]

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lz4-c-1.9.3 0:01, 1.62s/it]	179 KB	: 9% 0.08920006315434159/1 [00:00<0
pyparsing-3.0.9 0:00, 1.38it/s]	79 KB	: 20% 0.20147317421084346/1 [00:00<0
zipp-3.15.0 0:00, 6.28it/s]	17 KB	: 95% 0.9527243123800663/1 [00:00<0
cytoolz-0.12.0 0:03, 3.35s/it]	373 KB	: 4% 0.04292432439513224/1 [00:00<0
cycler-0.11.0	10 KB	: 100% 1.0/1 [00:00<00:00, 5.08it/s]
numpy-base-1.24.3 0:01, 1.57s/it]	6.9 MB	: 11% 0.1130739084026806/1 [00:00<0

certifi-2023.5.7 | 149 KB | : 11% 0.10751855521941424/1 [00:00<0
0:02, 2.37s/it]

dbus-1.13.18 | 504 KB | : 3% 0.03175446111028202/1 [00:00<0
0:08, 8.76s/it]

zipp-3.15.0 | 17 KB | : 100% 1.0/1 [00:00<00:00, 6.28it/s]

numpy-base-1.24.3 | 6.9 MB | : 32% 0.3166069435275057/1 [00:00<0
0:00, 1.26it/s]

pyparsing-3.0.9 | 79 KB | : 100% 1.0/1 [00:00<00:00, 3.25it/s]

pyparsing-3.0.9 | 79 KB | : 100% 1.0/1 [00:00<00:00, 3.25it/s]

pandas-1.5.3 | 12.0 MB | : 0% 0.0013064080174413125/1 [00:00
<04:19, 259.66s/it]

importlib-metadata-6 | 25 KB | : 63% 0.6344977151266362/1 [00:00<0
0:00, 1.77it/s]

kiwisolver-1.4.4 | 76 KB | : 21% 0.20959983625012793/1 [00:00<0
0:01, 1.80s/it]

lcms2-2.12 | 312 KB | : 5% 0.0513564767651438/1 [00:00<0

0:07, 7.60s/it]

fmpy-base-0.3.15 | 5.9 MB | : 0% 0.0026445845577826553/1 [00:00<02:30, 151.13s/it]

numpy-base-1.24.3 | 6.9 MB | : 62% 0.6241679743827969/1 [00:00<0:00, 1.97it/s]

cycler-0.11.0 | 10 KB | : 100% 1.0/1 [00:00<00:00, 5.08it/s]

conda-23.5.0 | 994 KB | : 2% 0.016095693930320107/1 [00:00<00:25, 26.25s/it]

pandas-1.5.3 | 12.0 MB | : 8% 0.083610113116244/1 [00:00<00:03, 4.12s/it]

libdeflate-1.17 | 69 KB | : 23% 0.2313862840357022/1 [00:00<0:01, 2.07s/it]

fmpy-base-0.3.15 0:01, 1.74s/it]	5.9 MB	: 22% 0.2195005182959604/1 [00:00<0
numpy-base-1.24.3 0:00, 1.89it/s]	6.9 MB	: 82% 0.8231780531715147/1 [00:00<0
libpq-12.9 01:10, 70.92s/it]	2.1 MB	: 1% 0.007421257845226189/1 [00:00<
pandas-1.5.3 0:01, 2.14s/it]	12.0 MB	: 18% 0.18420353045922505/1 [00:00<0
platformdirs-3.5.1 0:00, 1.55it/s]	18 KB	: 88% 0.8849041317850391/1 [00:00<0

fmpy-base-0.3.15 | 5.9 MB | : 42% 0.4204889446874422/1 [00:00<0
0:00, 1.04s/it]

blas-1.0 | 6 KB | : 100% 1.0/1 [00:00<00:00, 1.64it/s]

libpq-12.9 | 2.1 MB | : 77% 0.7718108159035236/1 [00:00<0
0:00, 1.63it/s]

pandas-1.5.3 | 12.0 MB | : 26% 0.2586687874533799/1 [00:00<0
0:01, 1.82s/it]

importlib_resources- | 30 KB | : 53% 0.5280051563003545/1 [00:00<0
0:00, 1.22s/it]

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lz4-c-1.9.3 | 179 KB | : 100% 1.0/1 [00:00<00:00, 1.43it/s]

cytoolz-0.12.0 | 373 KB | : 100% 1.0/1 [00:00<00:00, 1.40it/s]

cytoolz-0.12.0 | 373 KB | : 100% 1.0/1 [00:00<00:00, 1.40it/s]

pandas-1.5.3 | 12.0 MB | : 34% 0.33966608453474123/1 [00:00<0
0:01, 1.60s/it]

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fmpy-base-0.3.15 | 5.9 MB | : 95% 0.9494058562439732/1 [00:00<00:00, 1.74it/s]

certifi-2023.5.7 | 149 KB | : 100% 1.0/1 [00:00<00:00, 1.28it/s]

certifi-2023.5.7 | 149 KB | : 100% 1.0/1 [00:00<00:00, 1.28it/s]

pandas-1.5.3 | 12.0 MB | : 42% 0.4167441575637787/1 [00:00<00:00, 1.51s/it]

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pandas-1.5.3 | 12.0 MB | : 52% 0.5199503909416424/1 [00:00<0
0:00, 1.30s/it]

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importlib-metadata-6 | 25 KB | : 100% 1.0/1 [00:00<00:00, 1.09s/it]

importlib-metadata-6 | 25 KB | : 100% 1.0/1 [00:00<00:00, 1.09s/it]

dbus-1.13.18 | 504 KB | : 100% 1.0/1 [00:01<00:00, 1.00s/it]

pandas-1.5.3 | 12.0 MB | : 60% 0.6048669120753277/1 [00:01<00:00, 1.35s/it]

kiwisolver-1.4.4 | 76 KB | : 100% 1.0/1 [00:01<00:00, 1.02s/it]

dbus-1.13.18 | 504 KB | : 100% 1.0/1 [00:01<00:00, 1.00s/it]

kiwisolver-1.4.4 | 76 KB | : 100% 1.0/1 [00:01<00:00, 1.02s/it]

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pandas-1.5.3 | 12.0 MB | : 69% 0.6871706171741304/1 [00:01<00:00, 1.31s/it]

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libdeflate-1.17 | 69 KB | : 100% 1.0/1 [00:01<00:00, 1.16s/it]

libdeflate-1.17 | 69 KB | : 100% 1.0/1 [00:01<00:00, 1.16s/it]

pandas-1.5.3 | 12.0 MB | : 79% 0.7877640345171114/1 [00:01<00:00, 1.21s/it]

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lcms2-2.12 | 312 KB | : 100% 1.0/1 [00:01<00:00, 1.20s/it]

lcms2-2.12 | 312 KB | : 100% 1.0/1 [00:01<00:00, 1.20s/it]

pandas-1.5.3 | 12.0 MB | : 87% 0.873986963668238/1 [00:01<00:00, 1.25s/it]

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platformdirs-3.5.1 | 18 KB | : 100% 1.0/1 [00:01<00:00, 1.55it/s]

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blas-1.0 | 6 KB | : 100% 1.0/1 [00:01<00:00, 1.64it/s]

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conda-23.5.0 | 994 KB | : 100% 1.0/1 [00:03<00:00, 3.80s/it]


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conda-23.5.0      | 994 KB      | : 100% 1.0/1 [00:03<00:00, 3.80s/it]
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importlib_resources- | 30 KB      | : 100% 1.0/1 [00:04<00:00, 4.74s/it]
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importlib_resources- | 30 KB      | : 100% 1.0/1 [00:04<00:00, 4.74s/it]
```

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numpy-base-1.24.3 | 6.9 MB | : 100% 1.0/1 [00:07<00:00, 1.89it/s]

libpq-12.9 | 2.1 MB | : 100% 1.0/1 [00:07<00:00, 1.63it/s]

fmpy-base-0.3.15 | 5.9 MB | : 100% 1.0/1 [00:09<00:00, 1.74it/s]

pandas-1.5.3 | 12.0 MB | : 100% 1.0/1 [00:15<00:00, 42.40s/it]

pandas-1.5.3 | 12.0 MB | : 100% 1.0/1 [00:15<00:00, 42.40s/it]

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Preparing transaction: \ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\
00| 00/ 00- 00\ 00| 00/ 00done
Verifying transaction: \ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\
00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/
00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00done
Executing transaction: \ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\
00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/
00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\
00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/
00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\
00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/
00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\
00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/
00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\
00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/
00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\
00| 00/ 00- 00\ 00| 00/ 00done
```

```
In [ ]: !conda install matplotlib --yes
```

```
Collecting package metadata (current_repodata.json): - 00\ 00| 00/ 00-
00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00|
00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00-
00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00done
Solving environment: - 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00-
00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00|
00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00-
00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00|
00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00-
00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00|
00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00| 00/ 00- 00\ 00done
```

Package Plan

```
environment location: /usr/local

added / updated specs:
- matplotlib
```

The following packages will be downloaded:

package	build	
-----	-----	-----
brotli-1.0.9	h5eee18b_7	18 KB
brotli-bin-1.0.9	h5eee18b_7	19 KB
contourpy-1.0.5	py39hdb19cb5_0	204 KB
fonttools-4.25.0	pyhd3eb1b0_0	632 KB
libbrotlicommon-1.0.9	h5eee18b_7	70 KB
libbrotlidec-1.0.9	h5eee18b_7	31 KB
libbrotlienc-1.0.9	h5eee18b_7	264 KB
matplotlib-3.7.1	py39h06a4308_1	8 KB
matplotlib-base-3.7.1	py39h417a72b_1	6.7 MB
munkres-1.1.4	py_0	13 KB
-----	-----	-----
Total:		7.9 MB

The following NEW packages will be INSTALLED:

brotli	pkgs/main/linux-64::brotli-1.0.9-h5eee18b_7
brotli-bin	pkgs/main/linux-64::brotli-bin-1.0.9-h5eee18b_7
contourpy	pkgs/main/linux-64::contourpy-1.0.5-py39hdb19cb5_0
fonttools	pkgs/main/noarch::fonttools-4.25.0-pyhd3eb1b0_0
libbrotlicommon	pkgs/main/linux-64::libbrotlicommon-1.0.9-h5eee18b_7
libbrotlidec	pkgs/main/linux-64::libbrotlidec-1.0.9-h5eee18b_7
libbrotlienc	pkgs/main/linux-64::libbrotlienc-1.0.9-h5eee18b_7
matplotlib	pkgs/main/linux-64::matplotlib-3.7.1-py39h06a4308_1
munkres	pkgs/main/noarch::munkres-1.1.4-py_0

The following packages will be UPDATED:

```
matplotlib-base  conda-forge::matplotlib-base-3.4.3-py~ --> pkgs/main::matplotlib-base-3.7.1-py39h417a72b_1
```

The following packages will be SUPERSEDED by a higher-priority channel:

```
ca-certificates  conda-forge::ca-certificates-2023.5.7~ --> pkgs/main::ca-certificates-2023.01.10-h06a4308_0
certifi          conda-forge/noarch::certifi-2023.5.7~ --> pkgs/main::certifi-2023.5.7~
```

```
n/linux-64::certifi-2023.5.7-py39h06a4308_0
conda conda-forge::conda-23.5.0-py39hf3d152~ --> pkgs/mai
n::conda-23.5.0-py39h06a4308_0
```

Downloading and Extracting Packages

fonttools-4.25.0	632 KB	:	0% 0/1	[00:00<?, ?it/s]
libbrotlidec-1.0.9	31 KB	:	0% 0/1	[00:00<?, ?it/s]
munkres-1.1.4	13 KB	:	0% 0/1	[00:00<?, ?it/s]
brotli-1.0.9	18 KB	:	0% 0/1	[00:00<?, ?it/s]
brotli-bin-1.0.9	19 KB	:	0% 0/1	[00:00<?, ?it/s]
contourpy-1.0.5	204 KB	:	0% 0/1	[00:00<?, ?it/s]
libbrotlienc-1.0.9	264 KB	:	0% 0/1	[00:00<?, ?it/s]
libbrotlicommon-1.0.	70 KB	:	0% 0/1	[00:00<?, ?it/s]
matplotlib-base-3.7.	6.7 MB	:	0% 0/1	[00:00<?, ?it/s]
matplotlib-3.7.1	8 KB	:	0% 0/1	[00:00<?, ?it/s]
munkres-1.1.4	13 KB	:	100% 1.0/1	[00:00<00:00, 7.64it/s]
brotli-1.0.9	18 KB	:	87% 0.8690855081688945/1	[00:00<00:00, 6.62it/s]

```

brotli-bin-1.0.9      | 19 KB      | : 86% 0.8591955529917668/1 [00:00<0
0:00, 6.18it/s]
fonttools-4.25.0     | 632 KB     | : 3% 0.02530132575611338/1 [00:00<0
0:06, 6.99s/it]

```

```

libbrotlienc-1.0.9   | 264 KB     | : 6% 0.060625571232455995/1 [00:00<
00:02, 2.63s/it]

```

```

contourpy-1.0.5      | 204 KB     | : 8% 0.0783151534850817/1 [00:00<0
0:01, 2.13s/it]

```

```

libbrotlicommon-1.0. | 70 KB      | : 23% 0.22830070368564062/1 [00:00<0
0:00, 1.18it/s]

```

```

matplotlib-base-3.7. | 6.7 MB     | : 0% 0.002349343541735764/1 [00:00<
01:30, 90.62s/it]

```

```

munkres-1.1.4        | 13 KB      | : 100% 1.0/1 [00:00<00:00, 7.64it/s]

```

```

matplotlib-3.7.1     | 8 KB       | : 100% 1.0/1 [00:00<00:00, 4.02it/s]

```

```

brotli-1.0.9         | 18 KB      | : 100% 1.0/1 [00:00<00:00, 6.62it/s]

```

```

brotli-bin-1.0.9     | 19 KB      | : 100% 1.0/1 [00:00<00:00, 6.18it/s]
libbrotlidec-1.0.9   | 31 KB      | : 100% 1.0/1 [00:00<00:00, 2.94it/s]
libbrotlidec-1.0.9   | 31 KB      | : 100% 1.0/1 [00:00<00:00, 2.94it/s]

```


matplotlib-base-3.7.	6.7 MB	: 23% 0.23258501063184064/1 [00:00<00:00, 1.10s/it]
libbrotlienc-1.0.9	264 KB	: 100% 1.0/1 [00:00<00:00, 3.07it/s]
libbrotlienc-1.0.9	264 KB	: 100% 1.0/1 [00:00<00:00, 3.07it/s]
contourpy-1.0.5	204 KB	: 100% 1.0/1 [00:00<00:00, 2.72it/s]
contourpy-1.0.5	204 KB	: 100% 1.0/1 [00:00<00:00, 2.72it/s]
matplotlib-base-3.7.	6.7 MB	: 59% 0.587335885433941/1 [00:00<00:00, 1.85it/s]
libbrotlicommon-1.0.	70 KB	: 100% 1.0/1 [00:00<00:00, 2.44it/s]
libbrotlicommon-1.0.	70 KB	: 100% 1.0/1 [00:00<00:00, 2.44it/s]
fonttools-4.25.0	632 KB	: 100% 1.0/1 [00:00<00:00, 1.35it/s]

```
matplotlib-base-3.7. | 6.7 MB | : 100% 1.0/1 [00:01<00:00, 1.47s/it]
```



```
In [4]: from optlang import Model, Variable, Constraint, Objective
```

```
In [5]: describe('culture'); print(); #describe('liquidphase')
```

Saccharomyces cerevisiae - default parameters for strain H1022

```
In [6]: # Define culture constraint-based model
def culture(G, E):

    # LP calculation of the optimal qGr, qEr based on G and E values

    # - parameters
    q02max = 6.9e-3; kog = 2.3; koe = 1.6; YGr = 3.5; YEr = 1.32;
    alpha = 0.01; beta = 1.0

    # - transfer data from dynamic reactor model to static LP model
    qGr_opt = Variable('qGr_opt', lb=0)
    qEr_opt = Variable('qEr_opt', lb=0)

    # - LP model constraint and objective
    mu_max = Objective(YGr*qGr_opt + YEr*qEr_opt, direction='max')
    q02lim = Constraint(kog*qGr_opt + koe*qEr_opt, ub=q02max)
    qGlim = Constraint(qGr_opt, ub=alpha*max(0,G))
    qElim = Constraint(qEr_opt, ub=beta*max(0,E))

    # - put together the LP model
    yeast_model = Model(name='Yeast bottleneck model')
    yeast_model.objective = mu_max
    yeast_model.add(q02lim)
    yeast_model.add(qGlim)
    yeast_model.add(qElim)

    # - do LP optimization
    yeast_model.optimize()

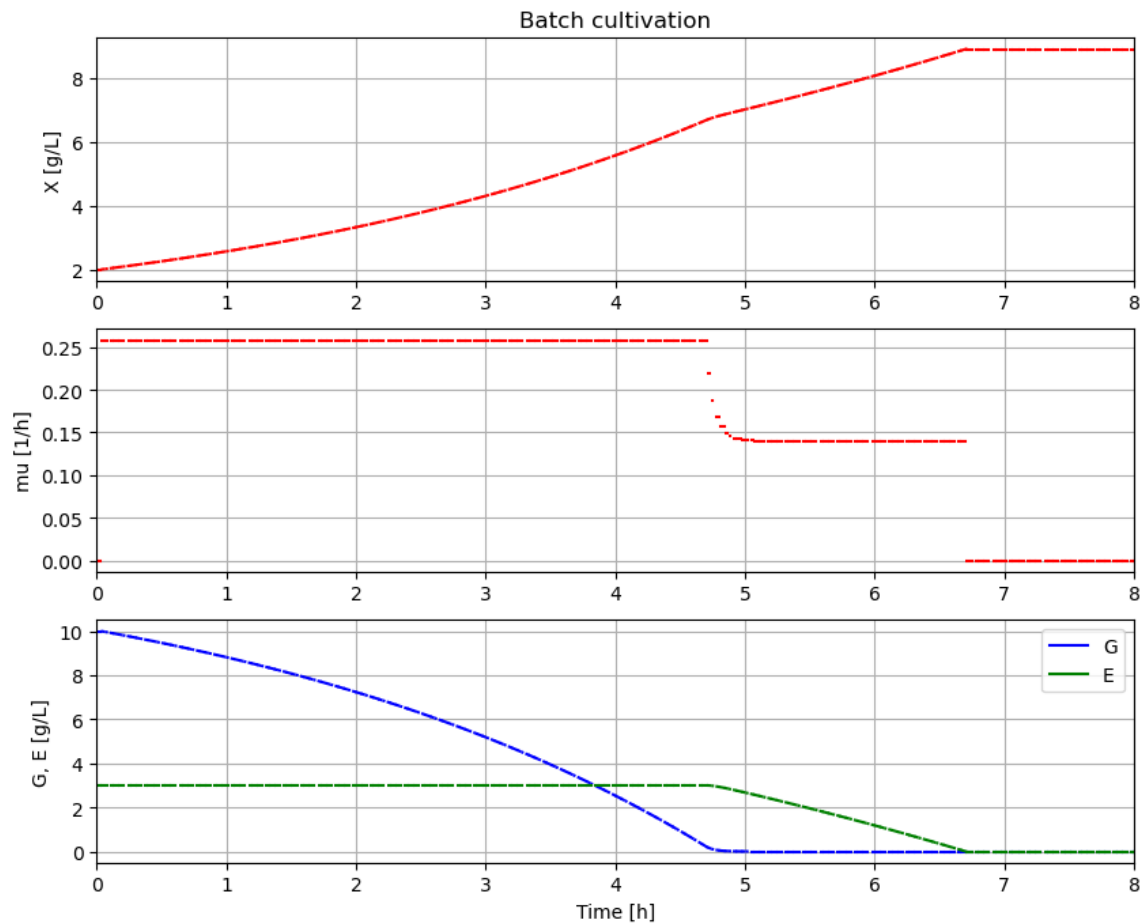
    return (yeast_model.objective.value, yeast_model.variables.qGr_opt.pr
```

```
In [7]: # Initialization
V_0=1.0
init(V_0=V_0, VX_0=V_0*2.0, VG_0=V_0*10, VE_0=3.0)
```

```
In [8]: # Loop of simulations
t_final = 8.0
t_samp = 0.0333
n_samp = t_final/t_samp + 1
```

```
In [9]: # Simulate n sample steps
newplot(title='Batch cultivation', plotType='TimeSeries2')
ax1.set_xlim([0, t_final]); ax2.set_xlim([0, t_final]); ax3.set_xlim([0,

simu(t_samp, options=opts_fast)
for i in range(int(n_samp)):
    (mum_opt, qGr_opt, qEr_opt, q02_opt) = culture(sim_res['bioreactor.c[
    par(mum=mum_opt, qGr=qGr_opt, qEr=qEr_opt, q02=q02_opt)
    simu(t_samp, 'cont', options=opts_fast)
```



```
In [10]: system_info()
```

System information

- OS: Linux
- Python: 3.8.16
- Scipy: not installed in the notebook
- FMPy: 0.3.15
- FMU by: OpenModelica Compiler OpenModelica 1.21.0
- FMI: 2.0
- Type: ME
- Name: BPL_YEAST_COB.Batch
- Generated: 2023-05-31T09:43:28Z
- MSL: 3.2.3
- Description: Bioprocess Library version 2.1.1
- Interaction: FMU-explore for FMPy version 0.9.8

```
In [11]: !conda list optlang
```

packages in environment at /home/colab/miniconda3/envs/fmipy:

#	Name	Version	Build	Channel
	optlang	1.7.0	pyhd8ed1ab_0	conda-forge

```
In [ ]:
```