**Analysis steps**

**Beta bursts**

1. Preprocess data in Brainstorm
   1. Reject bad electrodes
   2. Bandpass filter (0.5-100Hz)
   3. Notch filter (60 Hz)
   4. Resample to 250Hz
   5. Re-reference to an average reference
   6. Remove bad segments through visual inspection
   7. ICA for eye blinks and muscle artifacts
2. Import raw file in database
   1. Motor data – epoch time (-1.5s,10.5s)

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* 1. Rest data – Split in blocks of 3.6s

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1. Reject first 5 trials from rest and motor epochs
2. Concatenate time of raw files and extract channels of interest

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1. Export the concatenated file to **.csv with header** following the proper naming convention:

# filename = participant\_task\_session\_block.csv

# e.g. AD0109\_motor\_20Hz\_post15.csv

# e.g. AD0109\_rest\_sham\_base.csv

participant (e.g.AD0109), task (rest vs motor), session (20Hz vs 70Hz vs sham), block (base, post15, post45)

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1. Run extract\_bursts\_filtering\_entire\_trial.py to extract bursts
   1. This code will extract the burst characteristics (rate, amplitude, duration) for each of the above file and will be saved as bursts\_FILENAME.csv
   2. Before running, make sure to change the parameters as needed, in particular:
      1. import\_folder (where the files from step 5. were saved)
      2. export\_folder (where the beta burst files will be saved)
      3. mov\_epoch\_intervals (depends on the motor task and how epochs were separated in Brainstorm)
         1. [-1.1s, -0.1s] Pre-movement
         2. [0.5s, 3.5s] Movement
         3. [5s, 8s] Post-movement
      4. mov\_epoch\_name\_intervals
      5. rest\_intervals (depends on the resting state epochs were separated in Brainstorm)
      6. rest\_name\_intervals
   3. The bursts\_FILENAME.csv has each line representing one burst within the file. The first column is the burst identifier: channel\_interval\_epoch\_index
      1. Channel = channel from which the burst was extracted
      2. Interval = Movement or Resting state interval as defined in mov\_epoch\_name\_intervals and rest\_name\_intervals
      3. Epoch = In which motor or rest epoch the burst is identified
      4. Index = The index number of the burst in the current channel, interval and epoch

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1. Create the bad\_channels.csv file
   1. Run bad\_channels.py and set the “path” variable as the export folder used above.
   2. Open the created file in Excel and manually enter on the second column all the bad channels.
      1. Bad channels can be obtained in Brainstorm by right clicking on an epoch from each file > View all the bad channels
      2. If no bad channels are within a file, write “N”

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1. Run graph\_bursts.py to plot the bursts
   1. Note: graph\_bursts.py needs to be changed based on what you need to plot
   2. Requires:
      1. A bad\_channels.csv file
      2. functions.py file to be in the same folder
   3. Change parameters at the top of the file:
      1. channels
      2. motor\_intervals\_of\_interest
      3. rest\_intervals\_of\_interest
   4. Comment/Uncomment the line\_error() function calls to plot the data you are interested in