Communication channels:

* Mattermost: <https://mattermost.brainhack.org/brainhack/channels/physiopy>
* Zoom: <https://us05web.zoom.us/j/6023034129?pwd=aTRKZlI5MG9aUG1DM1B4RG1kcGp3dz09>

Milestones

1. Exploratory Data Analysis
2. Basic frequency domain classifier
   1. Cardiac vs. respiratory
   2. Python
3. Explore automatic feature extraction tools
   1. MATLAB: hctsa <https://github.com/benfulcher/hctsa>
   2. Python: tsfresh <https://github.com/blue-yonder/tsfresh>
4. Advanced time-domain classifier: chest vs. O2 vs. CO2
   1. Python
5. Other approaches
6. Implementation into phys2bids

**Day 1**

Kickoff meeting:

* Tomorrow: meeting at 11am
* Task distribution
  + Akanksha: exploratory data analysis (Google Collab)
  + Inés: automatic feature extraction in MATLAB (hctsa)
  + David: time-domain feature extraction

**Day 2**

Progress:

* Exploratory analysis (Akanksha)
  + outliers in cardiac signal (subject 001)
  + signals of each patient look similar. Probably not statistically independent.
* Installed HCTSA (Inés) (require compiler)
* Created cardiac vs. respiratory notebook (skeleton only) (David)
* Started working on pure time-domain respiratory classification (David)

**Day 3**

Progress:

* Exploratory analysis
  + Cardiac vs. respiratory clearly separable. Threshold at 0.2-0.3 Hz should work
* HCTSA working!
  + It has potentially 7000 features! It was quite slow so we tested only a selection on them
  + Many tools: nice visualizations, PCA,
  + Achieved 100% accuracy with 3 PCA components from 22 features
* Time-domain classifier: working pretty ok! 99% accuracy with a decision tree. Classes could probably be better separated though.

Next steps

* Validate the method on phys2bids data: <https://osf.io/3txqr/files>
* Use frequency to classify cardiac vs. respiratory
* Decide which features are great for chest vs. O2 vs. CO2
  + Time features (mine)
  + Great features from HCTSA
* Note: caution with the O2, CO2 labelling as it is incorrect in the presentation figure.