SIGNAL PROCESSING IN MNE: DAY 2

3 – INDEPENDENT COMPONENT ANALYSIS

THE ICA CLASS

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ICN Interventional & Cognitive Neuromodulation

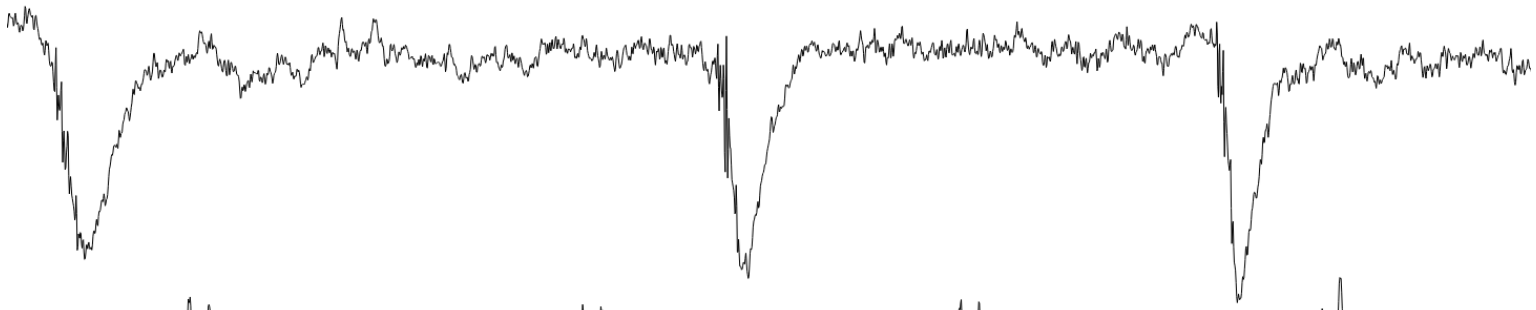
Brain and Data Science QAI LABS

bccn berlin

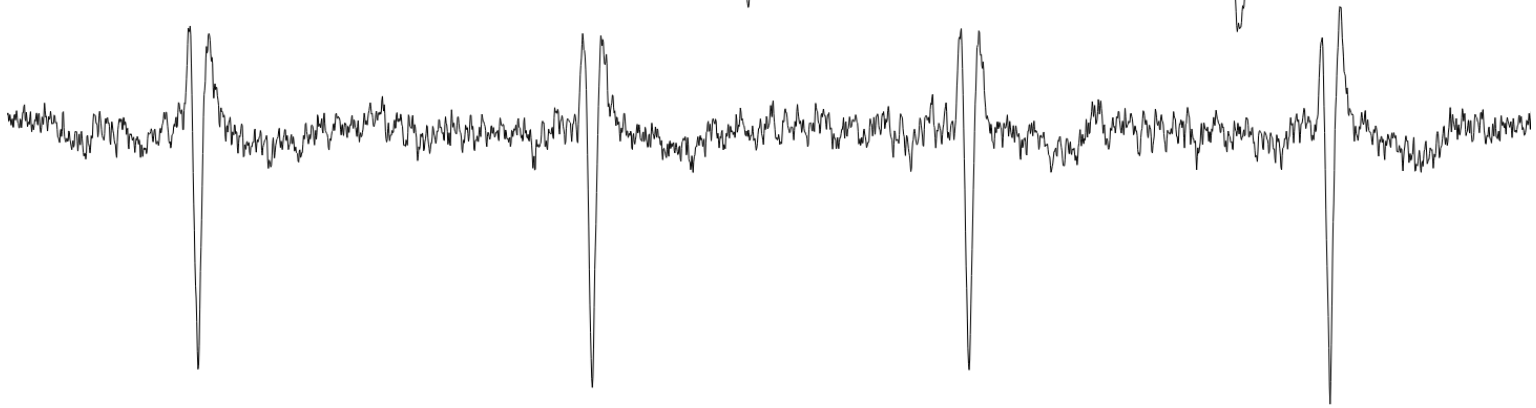
CHARITÉ

Signal contamination by artefacts

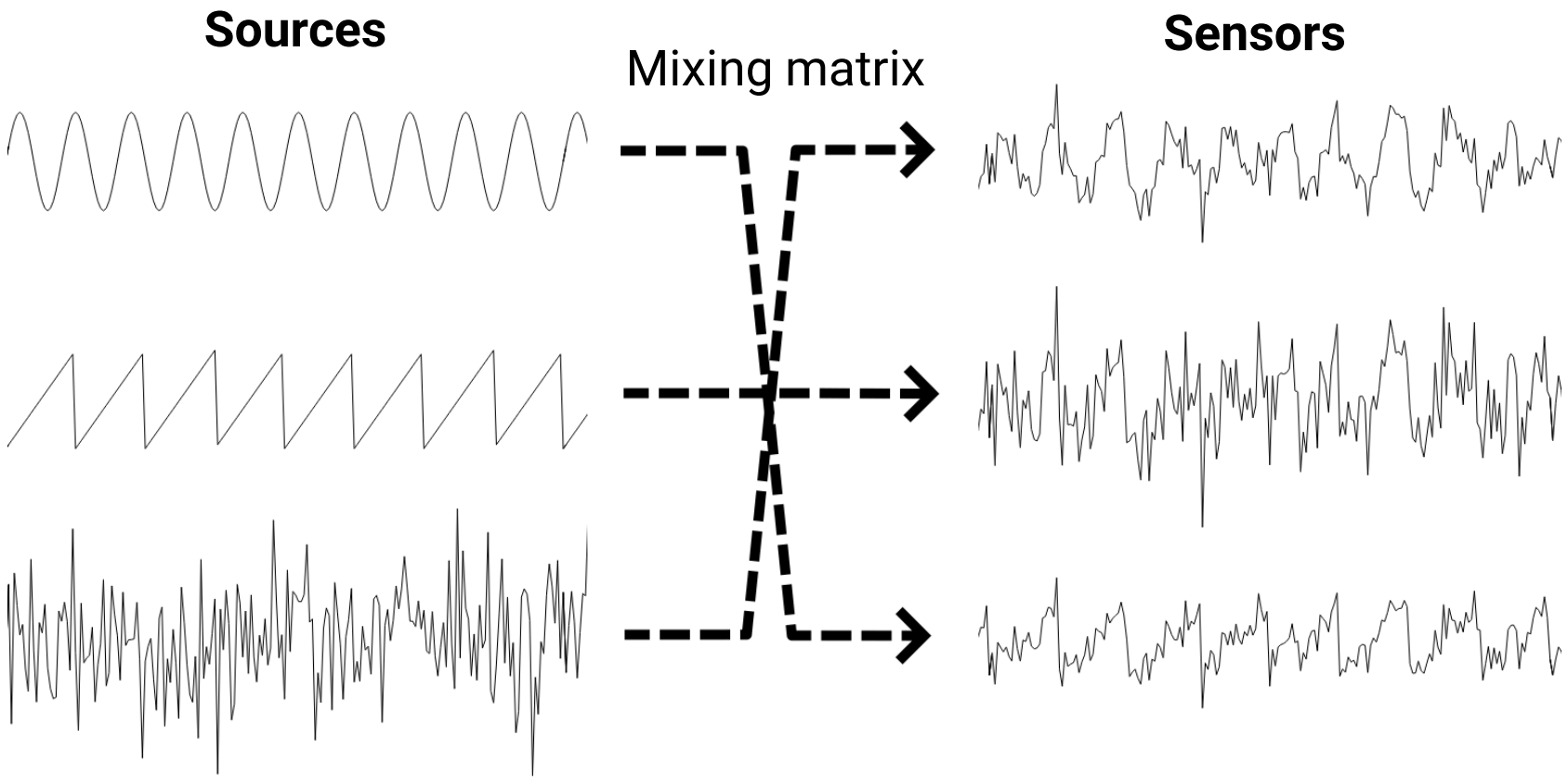
Ocular activity in EEG/MEG recordings



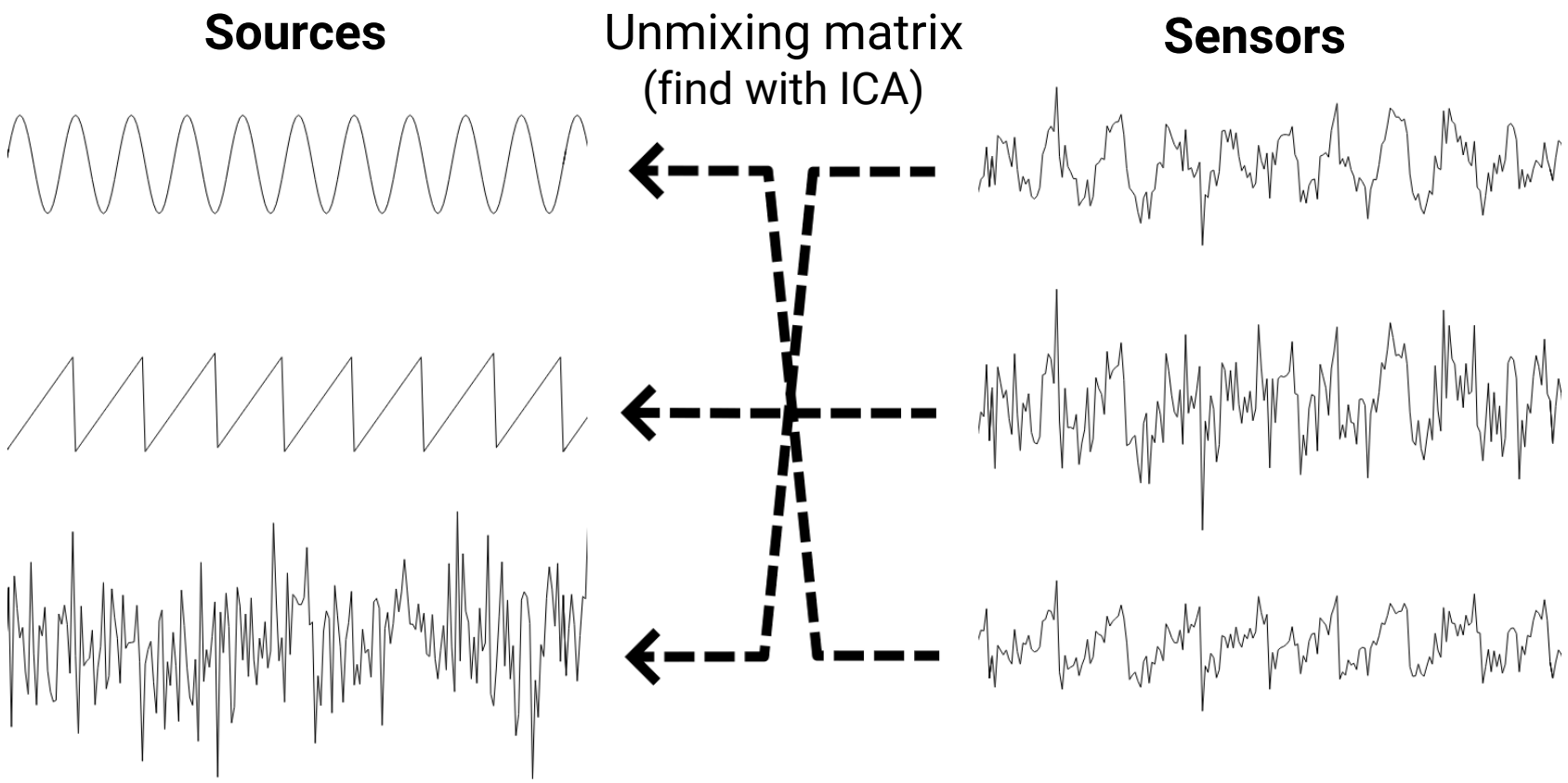
Cardiac activity in EEG/MEG recordings



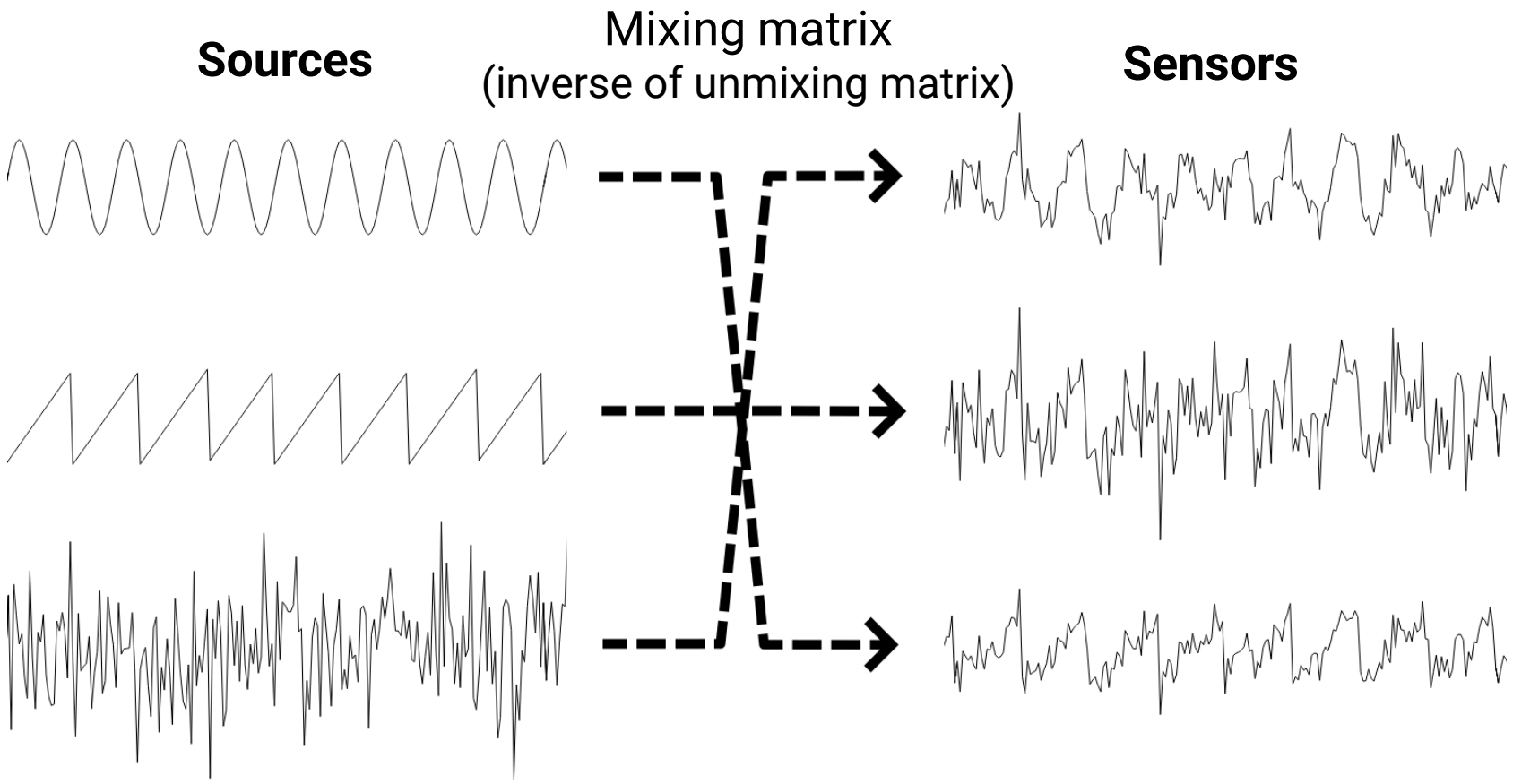
Sensor data is a mix of sources



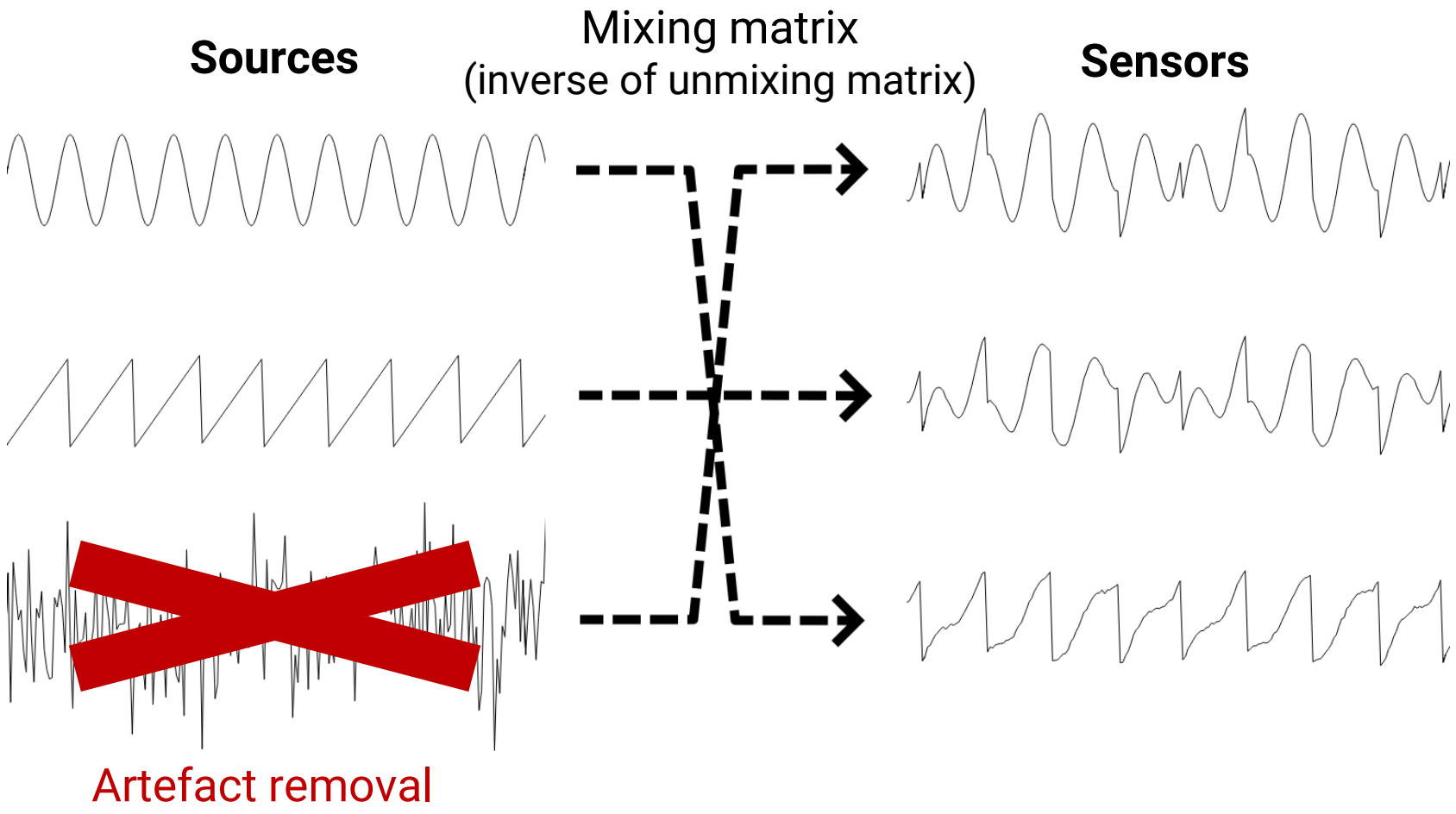
Data decomposition with ICA



Data reconstruction



Data reconstruction



Independent component analysis

mne.preprocessing.ICA

class mne.preprocessing.ICA(*n_components=None, *, noise_cov=None, random_state=None, method='fastica', fit_params=None, max_iter='auto', allow_ref_meg=False, verbose=None*) [source]

Data decomposition using Independent Component Analysis (ICA). This object estimates independent components from `mne.io.Raw`, `mne.Epochs`, or `mne.Evoked` objects. Components can optionally be removed (for artifact repair) prior to signal reconstruction.

> **Warning**
>
> ICA is sensitive to low-frequency drifts and therefore requires the data to be high-pass filtered prior to fitting. Typically, a cutoff frequency of 1 Hz is recommended.

Parameters:

n_components : *int* | *float* | *None*

Number of principal components (from the pre-whitening PCA step) that are passed to the ICA algorithm during fitting:

- `int`

  Must be greater than 1 and less than or equal to the number of channels.

Onto the notebook…

Conclusion

- ICA is a tool for decomposing data into independent components
- Unwanted components can be discarded when reconstructing data, as a tool for artefact removal
- ICA can be performed in MNE using the `ICA` class