

mne-denoise

A practical place for EEG / MEG denoisers

What is in the package, and what comes next

MNE DEV WEEK • **META PARIS**

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Today

- 1 Why it exists
- 2 What is in it today
- 3 Demo, validation, next steps

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Research Interests:

- Mobile M/EEG
- cognitive functions during naturalistic settings



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Research Interests:

- Decision Making in humans
- Brain disorders (ADHD/Epilepsy)
- M/EEG foundation models



Why mne-denoise?

- 01** **Methods are scattered.**

- 02** **Many implementations are research-only or unmaintained.**

- 03** **Comparisons need a lot of glue code.**

- 04** **Nothing feels native to MNE.**

Why mne-denoise?

- 01** **Methods are scattered.**

- 02** **Many implementations are research-only or unmaintained.**

- 03** **Comparisons need a lot of glue code.**

- 04** **Nothing feels native to MNE.**

How it started

- 1** **Oct 2024:** ported PyZapline Plus to Python
- 2** **Oct 2025:** open an MNE-Python issue to integrate PyZapline
- 3** **Jan 2026:** released mne-denoise 0.0.1
- 4** **Aug 2026:** ~10 denoisers, 30+ variations

mne-denoise today

Method family	Implemented methods	Typical use
Bias / Reproducibility-guided	DSS · Iterative DSS	Responses repeat across trials or conditions
Periodic / spectral	ZapLine · spectrum interpolation	Line noise and narrow-band artifacts
Reference-guided	iCanClean · Recursive iCanClean*	A reference channel or regressor is available
Subspace / transient	ASR · AdaptiveASR · JugglerASR	Short, high-variance bursts
Blind / spatial	BSS-CCA · SNS · SSA	Multichannel structure without a clean reference

~10 denoisers · 30+ variations · * experimental · in review: SOUND + SSP-SIR

mne-denoise today

DSS family

biased covariance / component ranking

DSS · Iterative DSS · ZapLine

event-locked · narrowband · SSVEP

+20 bias functions

CCA family

correlated multichannel structure

iCanClean · BSS-CCA

reference / pseudo-reference

lagged variants

ASR family

covariance-based transient reconstruction

**ASR · AdaptiveASR · JugglerASR
GuidedASR**

Forward-model methods

source-informed spatial denoising

SOUND · SSP-SIR

Other denoisers

additional spatial / spectral methods

Spectrum interpolation · SNS · SSA

~10 denoisers · 30+ variations

scikit-learn-like API, MNE objects + NumPy arrays

```
from mne_denoise import ZapLine

denoiser = ZapLine(...)
clean_raw = denoiser.fit_transform(raw)
clean_epochs = denoiser.transform(epochs)
clean_array = denoiser.transform(data)
```

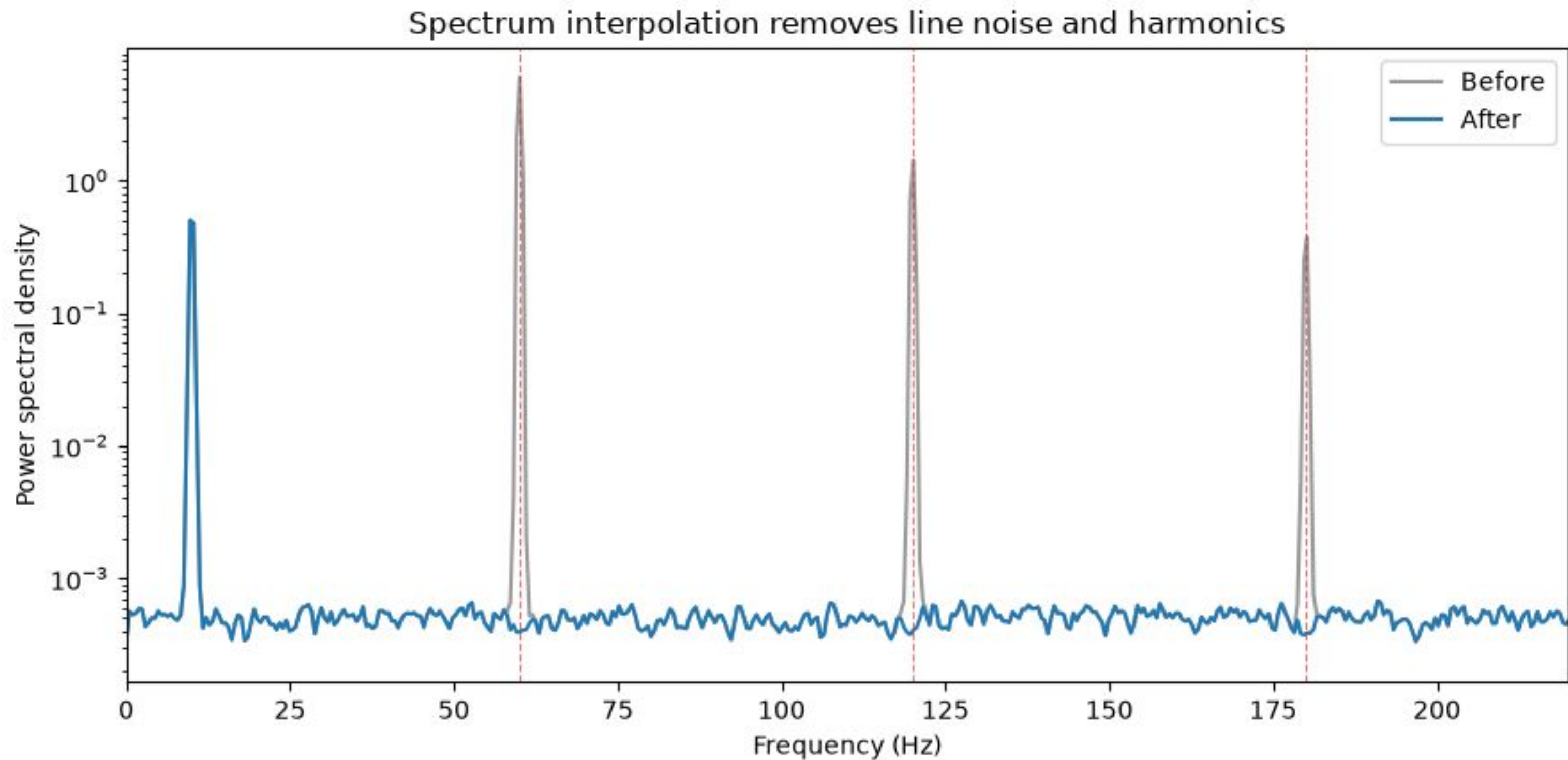
Estimator calls

fit
transform
fit_transform

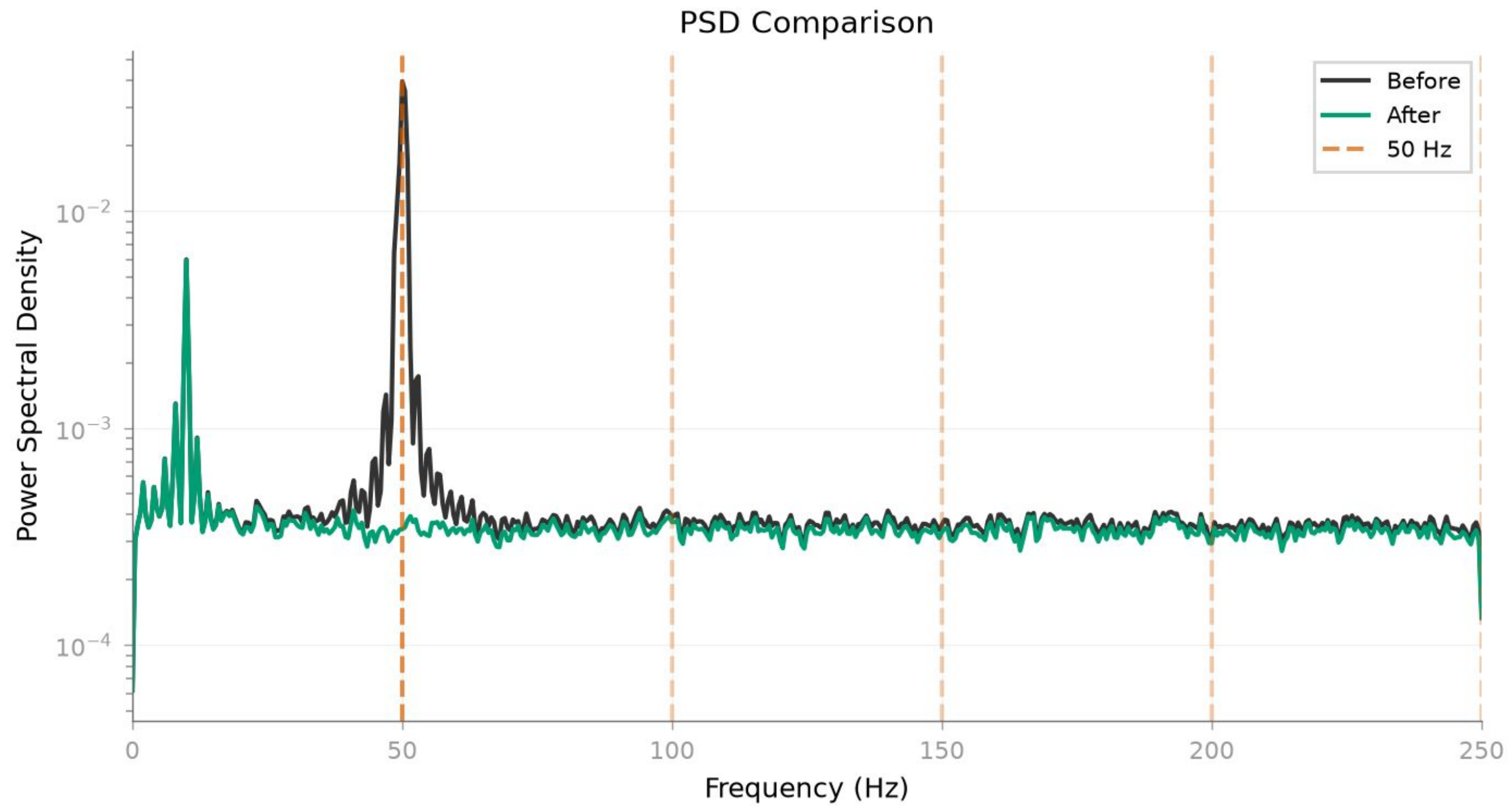
Accepted inputs

Raw · Epochs · Evoked
NumPy arrays

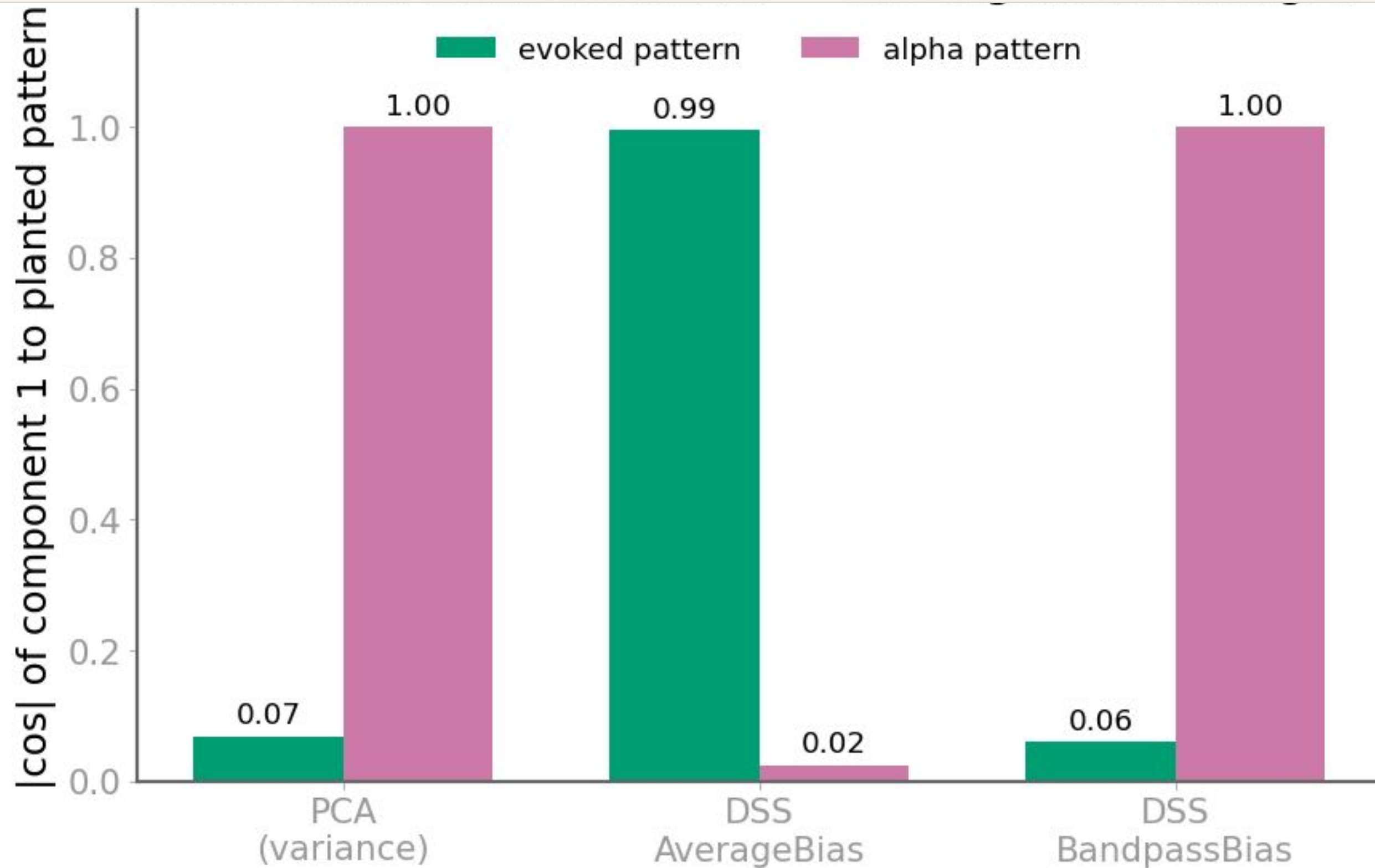
Examples: Spectrum Interpolation



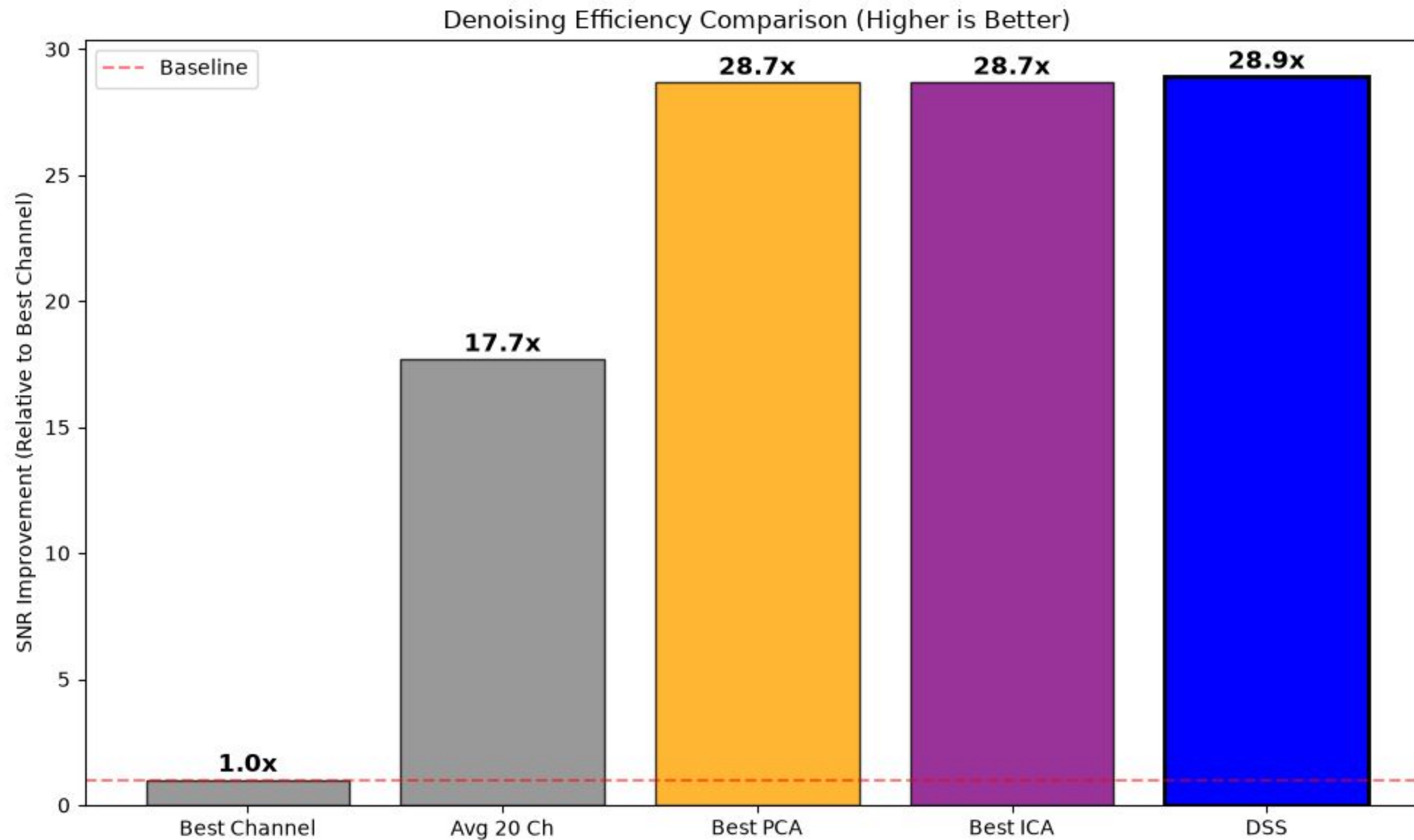
Examples: Zapline



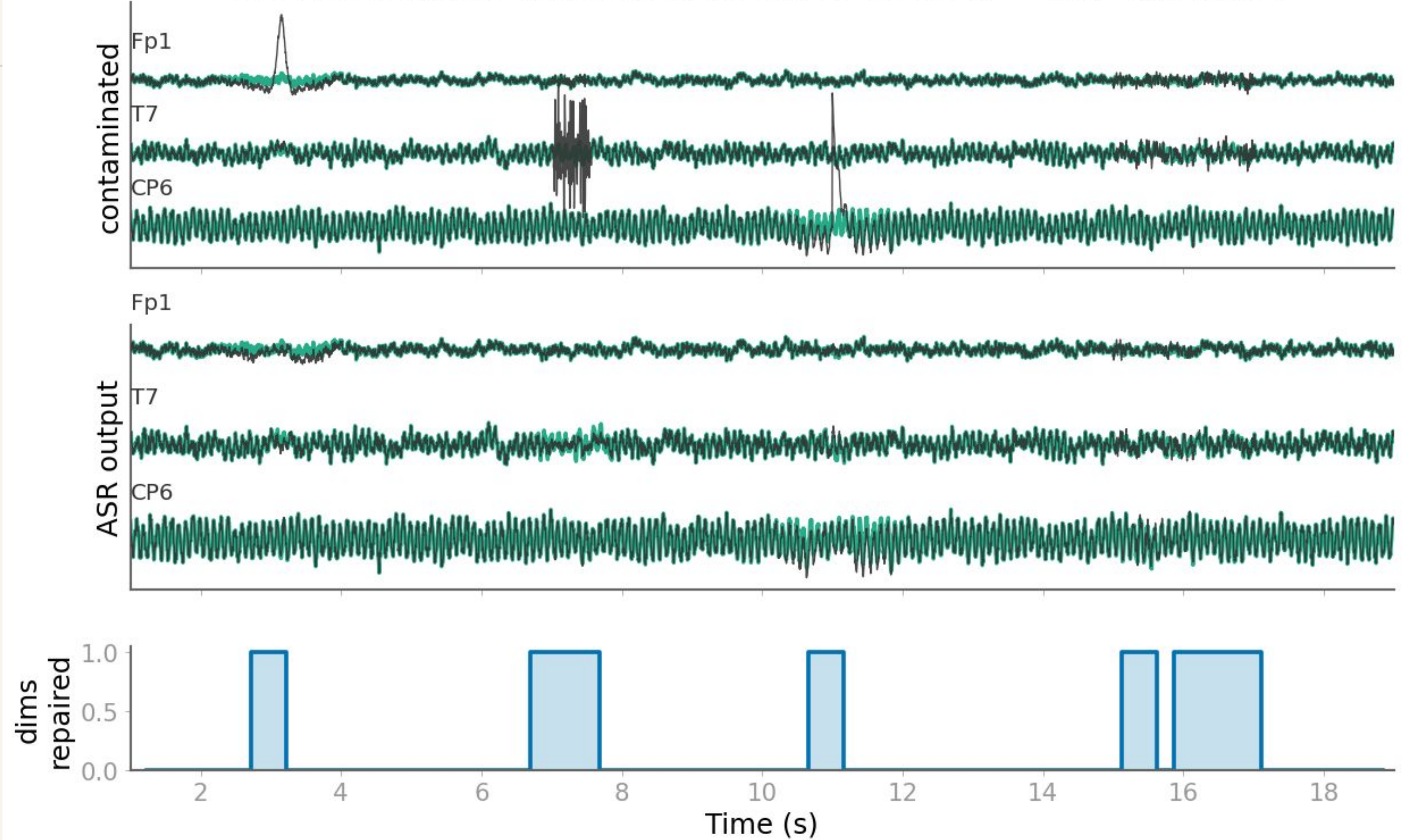
Examples: each DSS bias has a different purpose



Examples: DSS efficiency



Examples: ASR



Benchmarking and validation

With every denoiser: measure *artifact attenuation* and *signal preservation*?

Before / after views and removed components

Interactive component selection

Synthetic / known-ground-truth experiments and Public EEG + MEG datasets

Numerical parity where reference implementations exist

Enhancing speed and streaming performance

Next steps

1 Wrap up some of the remaining PRs and issues

2 Ship v0.0.2

3 Find a few active users with real, messy datasets

4 Tune the methods and the API

3 Ship v0.0.3 + preprint

Thank you for your attention!

Looking forward to this week !



Dr. Dan McCloy



Dr. Eric Larson



Prof. Karim Jerbi