Poster 11

End-to-End validation of the acquisition and reconstruction pipeline for 3D non-cartesian fMRI.

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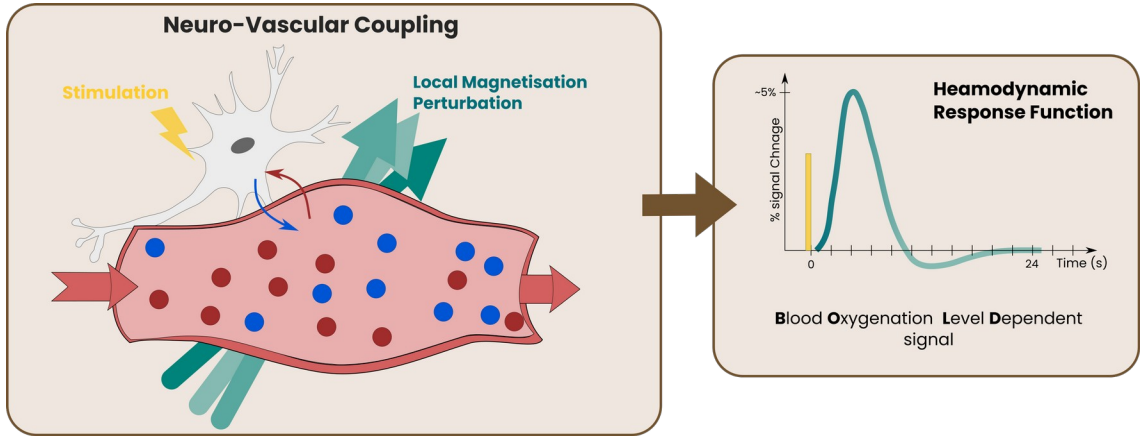
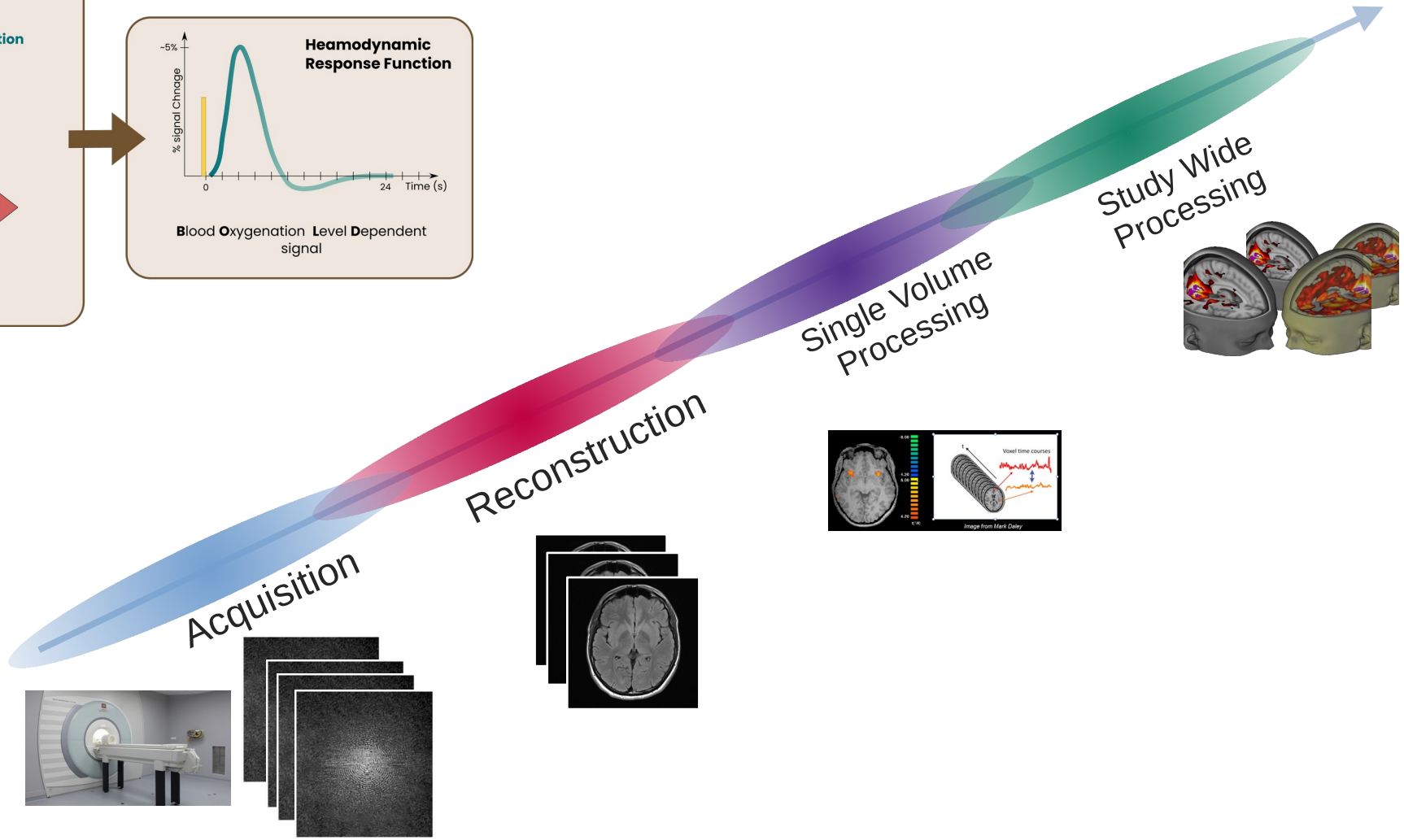
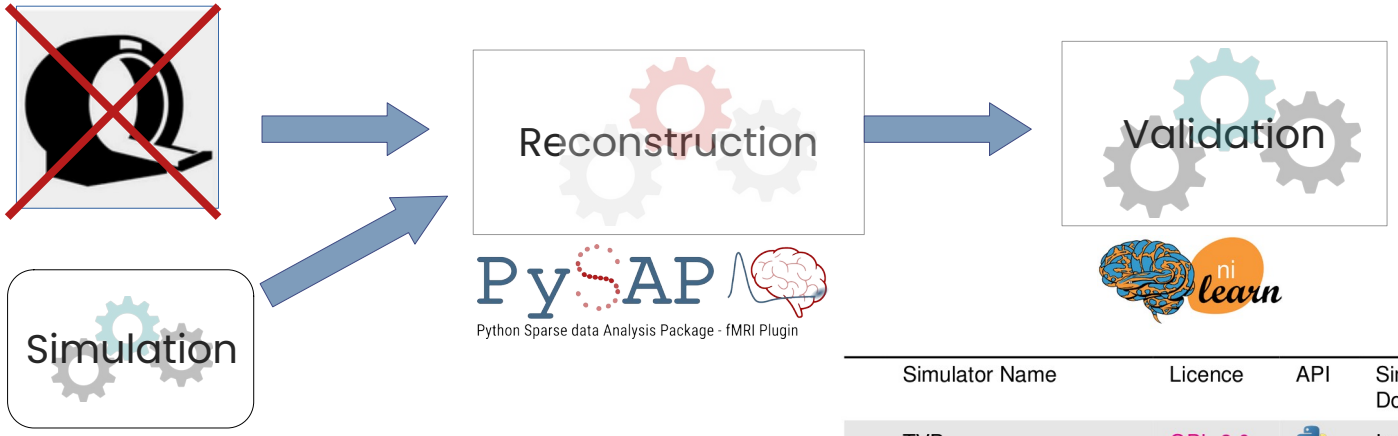
Functional MRI in a (tiny) nutshell...





A Solution to the Reproducibility Crisis for high-res fMRI



- Push for High Res. fMRI (Space & Time)
- Develop and compare new Acquisition/Reconstruction Methods
  - Esp. for 3D Non-Cartesian Setup
- Reproducibility Issues
  - Ensure control of *all* inputs (Brain included)

↳ *Simulation setup needed*

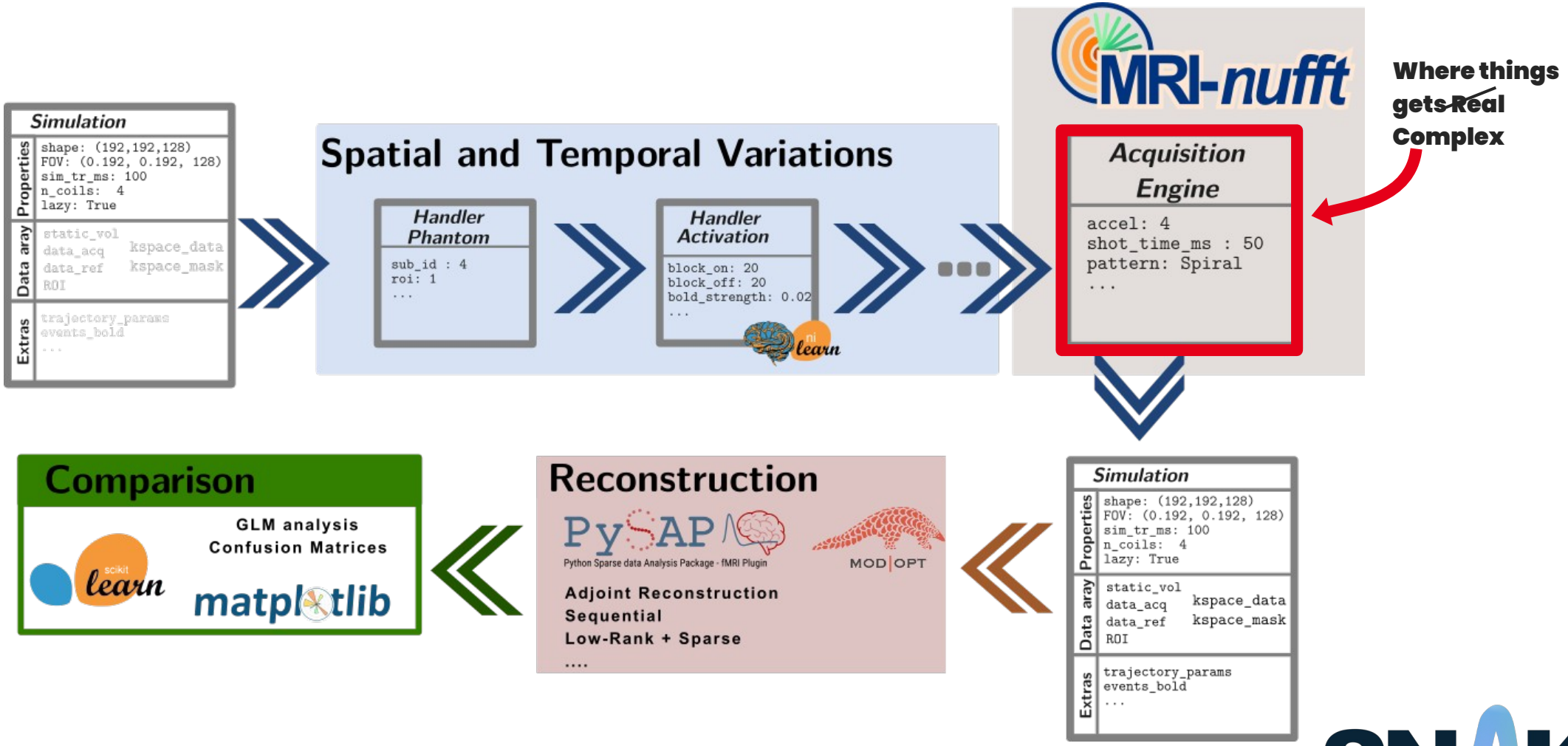
	Simulator Name	Licence	API	Sim. Domain	Required External Data	Interface	Reconstr.
	TVB (Sanz Leon et al., 2013)	GPL-3.0		Image		GUI/script	N/A
MRI Simulator	Jemris (Stöcker et al., 2010)	GPL-2.0		Bloch		GUI	ISMRMD raw data
MRI Simulator	ODIN (Jochimsen et al., 2006)	GPL-2.0		Bloch	Tissue Maps, Sequence	c++/GUI	FFT
MRI Simulator	MRILab (Liu et al., 2017)	BSD-2		Bloch	Preset Macros	GUI	FFT Non-Cartesian
MRI Simulator	Bloch-Solver (Kose & Kose, 2017)	Proprietary		Bloch	Tissue Maps,	script	FFT
fMRI Simulator	POSSUM (Drobnjak et al., 2006)	FSL		Bloch	Tissue Maps Sequence, Events	CLI	FFT
fMRI Simulator	Neurolib (Cakan et al., 2023)	MIT		Image	Connectivity Matrices	script	N/A
fMRI Simulator	SimTB (Erhardt et al., 2012)	Open Source		Image	Spatial Maps, Events	GUI	N/A
fMRI Simulator	NeuroRSim (Welvaert et al., 2011)	GPL-2.0		Image		script	N/A
fMRI Simulator	fmriSim (Ellis et al., 2020)	Apache-2.0		Image		script	N/A
	SNAKE-fMRI	*MIT*		*Kspace Image*	*Configuration files*	*script/CLI*	*Any (4D methods)*

for Sequence Programming

only Image Domain

Ours

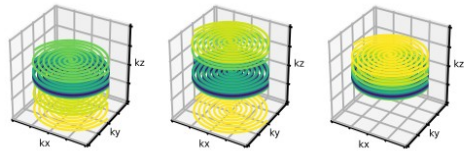
From simulated BOLD signals to K-Space ... and back

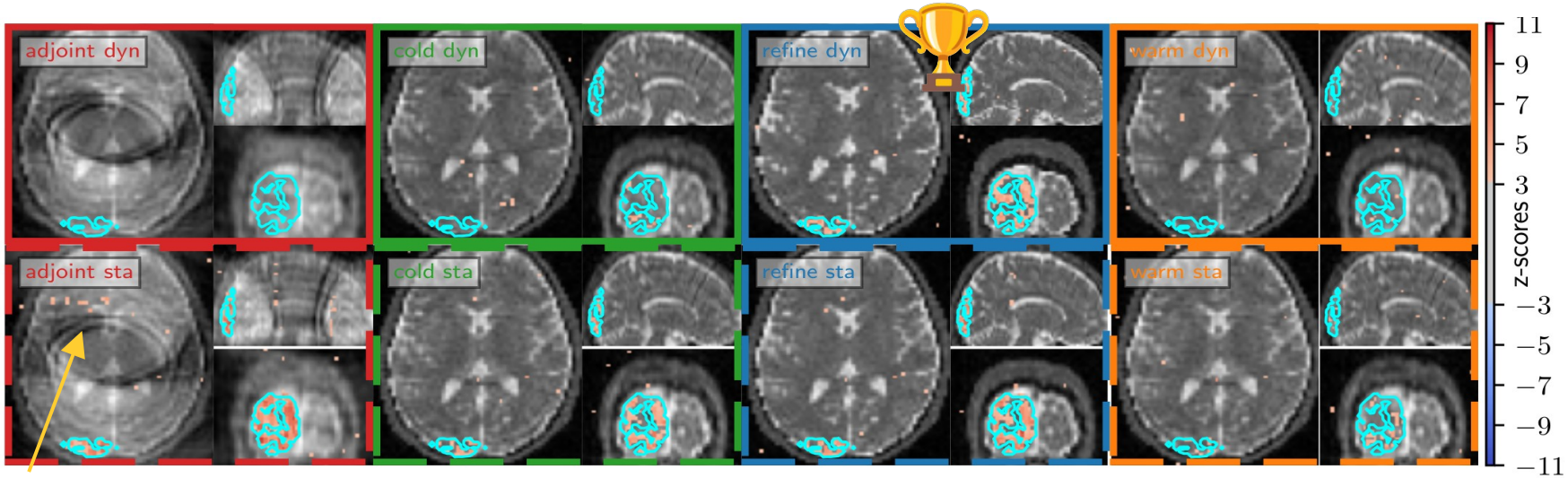


Simulator from **N**euro-**A**ctivation to **K**-space **E**valuation

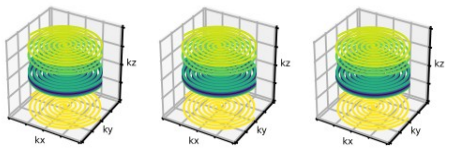
SNAKE

Simulation Scenario :
Tuning Acquisition & Reconstruction



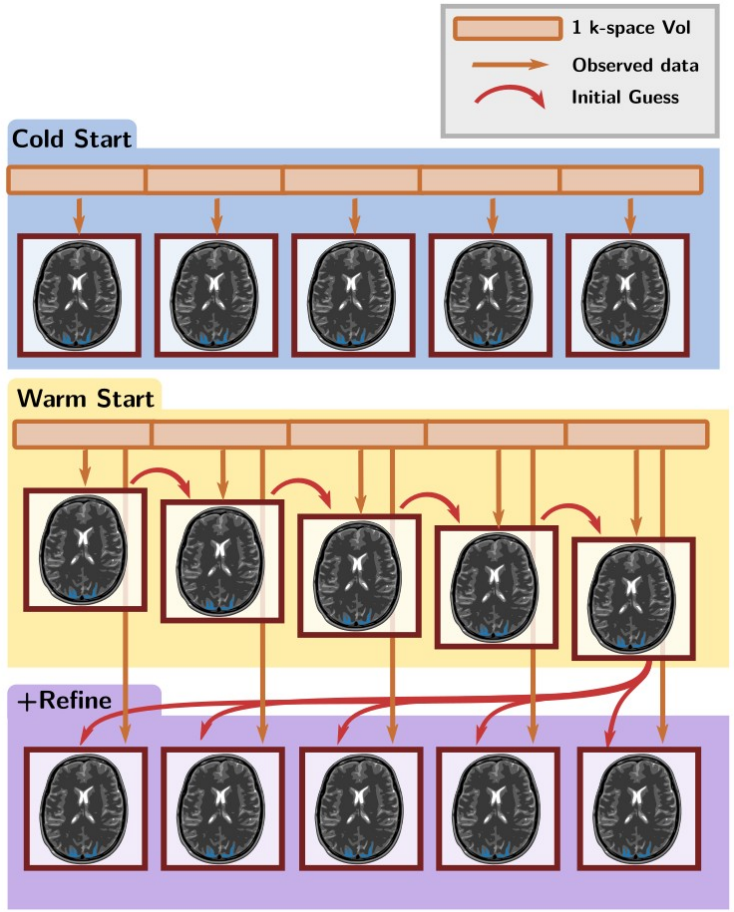


Aliased Activation



Spatial resolution: 3mm
Temporal Resolution: 700ms
AF=4 TR=50, TE=30, Tobs=25

Image Quality is not a proxy for good statistical performances.



Best Combination: 🏆
Dynamic Acquisition + Refined Reconstruction.

Thank you for your attention !

Come with your coffee at Poster 11

https://github.com/paquiteau/snake-fmri ⭐

https://arxiv.org/abs/2404.08282v1

```
$ pip install snake-fmri
$ snkf-main --config-name="scenario1"
# Using Hydra, parameters can be modified and run over a grid of parameter.
$ snkf-main --config-name="scenario2" -m ++reconstructors.sequential.restart_strategy=cold,warm,refine
```

To reproduce data of the previous slide