

Open-Source, Cross-Platform Workflow for MRI Data Acquisition and Image Reconstruction Based on the Pulseseq Framework

Team Name: **Pulseseq Rocks**

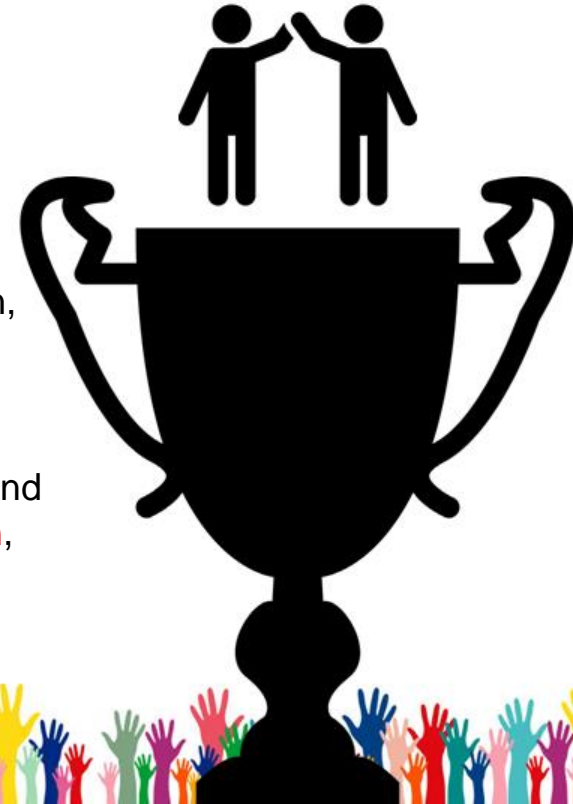
Abstract: #0948

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Reproducers:

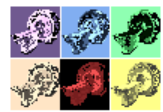
- Amaya Murguia, Andrea Jacobson, David Frey, Scott Peltier, and Jon-Fredrik Nielsen, from the University of Michigan, **Michigan**, USA
- Pengcheng Xu and Berkin Bilgic, from Massachusetts General Hospital, **Boston**, USA



Declaration of Financial Interests or Relationships

Speaker Name: Qingping Chen

I have no financial interests or relationships to disclose with regard to the subject matter of this presentation.



Introduction

- Motivation**

Data comparison & pooling

- Open-source, vendor-independent, easy-to-learn workflow**

- Data acquisition

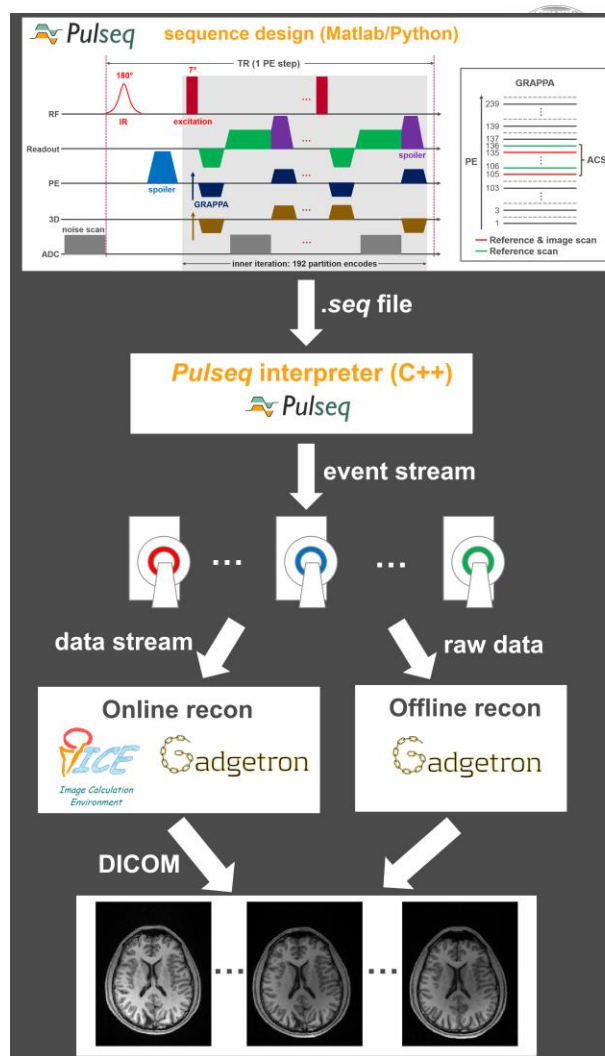
Pulseq¹

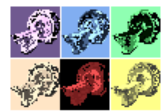
- Image reconstruction

ISMRMRD²

Gadgetron^{3,4}

1. Layton et al., MRM, 2017; 2. Inati et al., MRM, 2015;
3. Hansen et al., MRM 2013; 4. Xue et al., MRM, 2015.

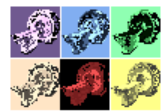




Methods



- **Sequences**
 - MPRAGE with 2-fold GRAPPA and noise scan
 - Multi-slice EPI with 3-echo navigator and ramp sampling
- **Objects:** phantom & human brain



Methods

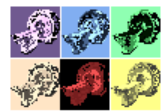


- Measurements:

center	vendor	scanner	version	# coil channel
Freiburg	Siemens	Trio 3T	VB19A	12
		Prisma 3T	VE11C, XA60A	20
		Cima.X 3T	XA61A	20
Boston	Siemens	Prisma 3T	XA30A	20
Michigan	GE	SIGNA UHP 3T	-	32

- Evaluation

- Pulseq- vs. vendor-based sequence
- Gadgetron- vs. vendor-based reconstruction



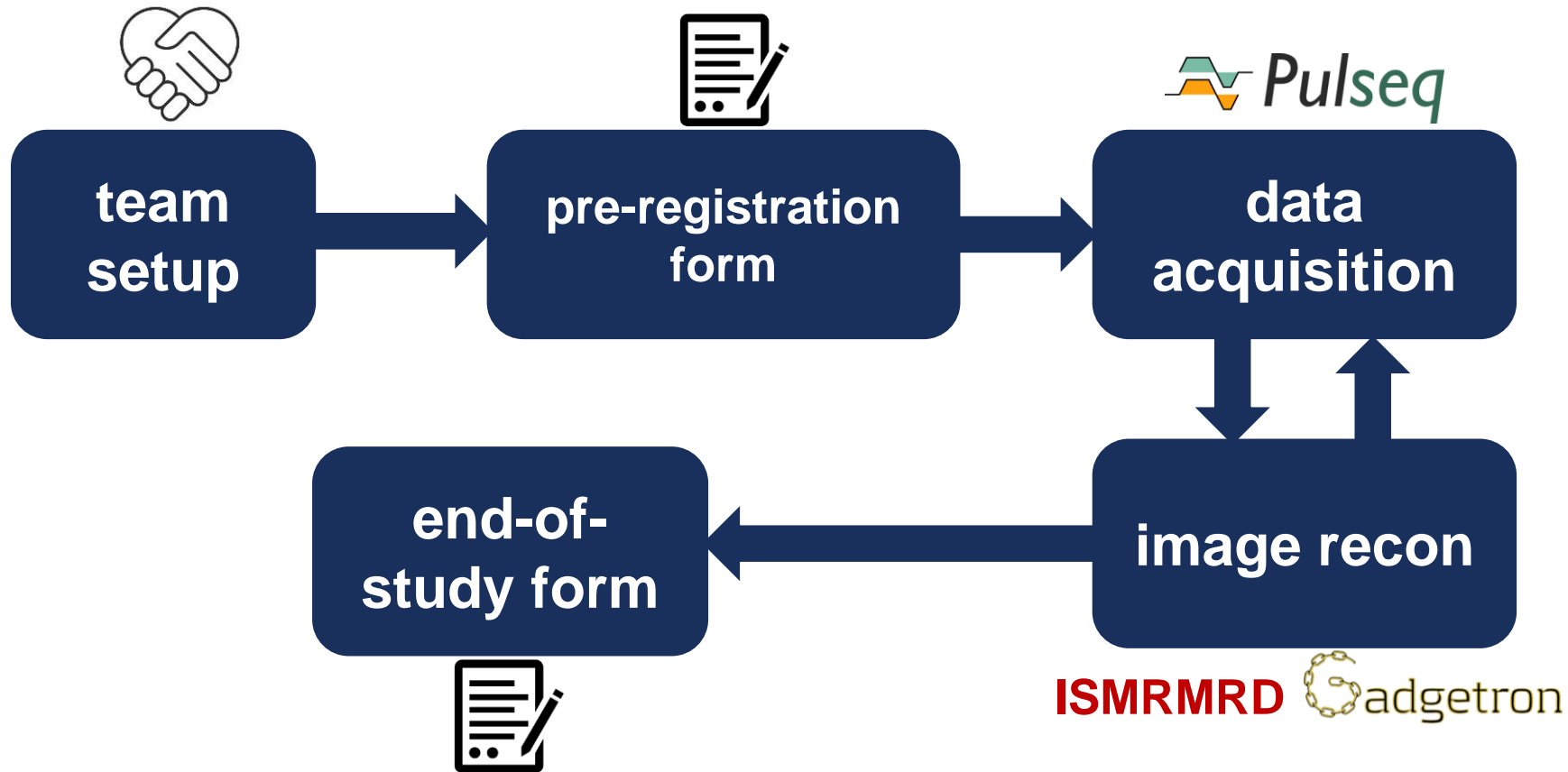
Networking phase

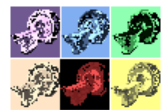


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Results: phantom @Siemens, Freiburg

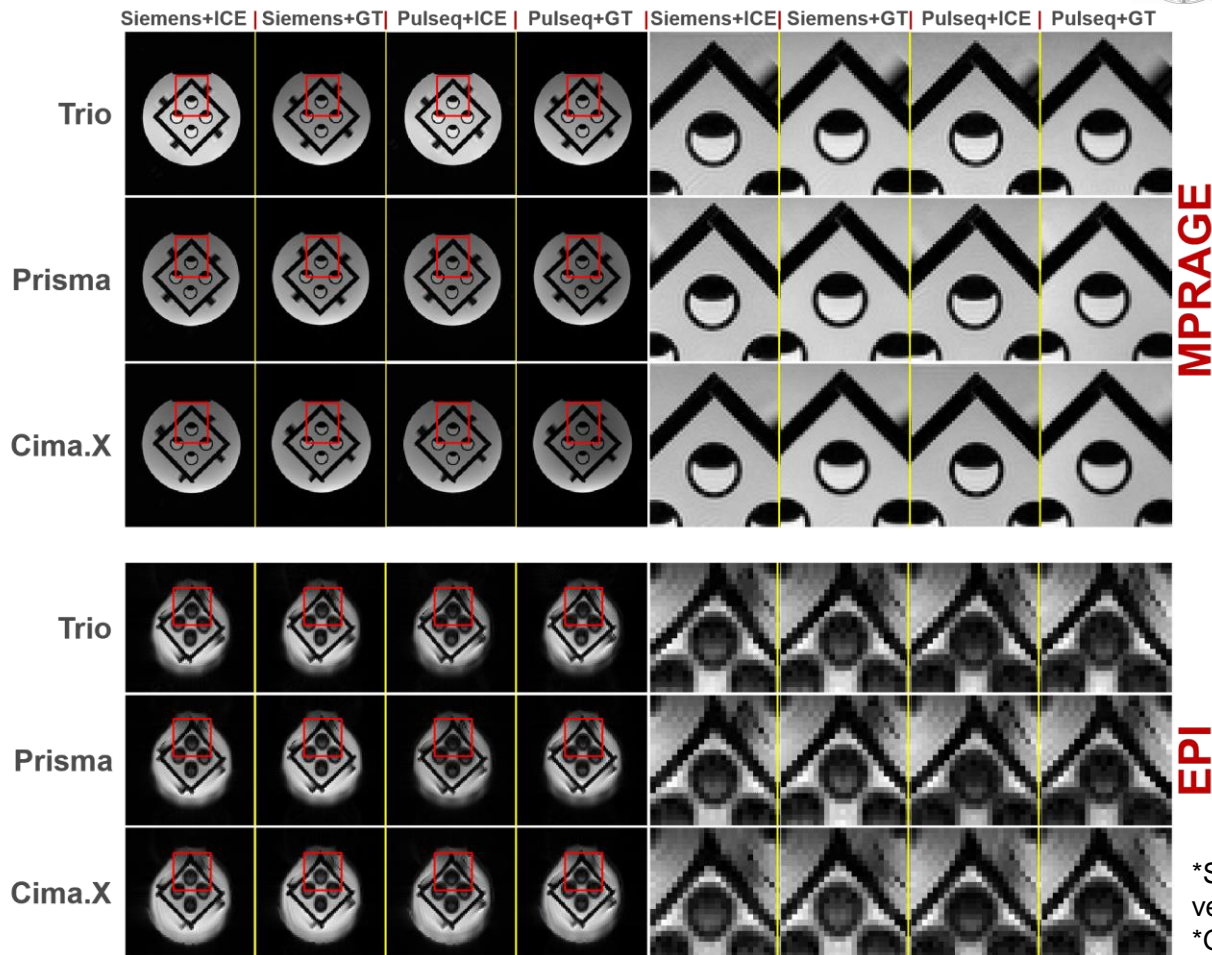


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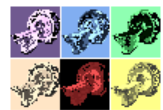
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*Siemens =
vendor-based sequence
*GT = Gadgetron



Results: in vivo @Siemens, Freiburg

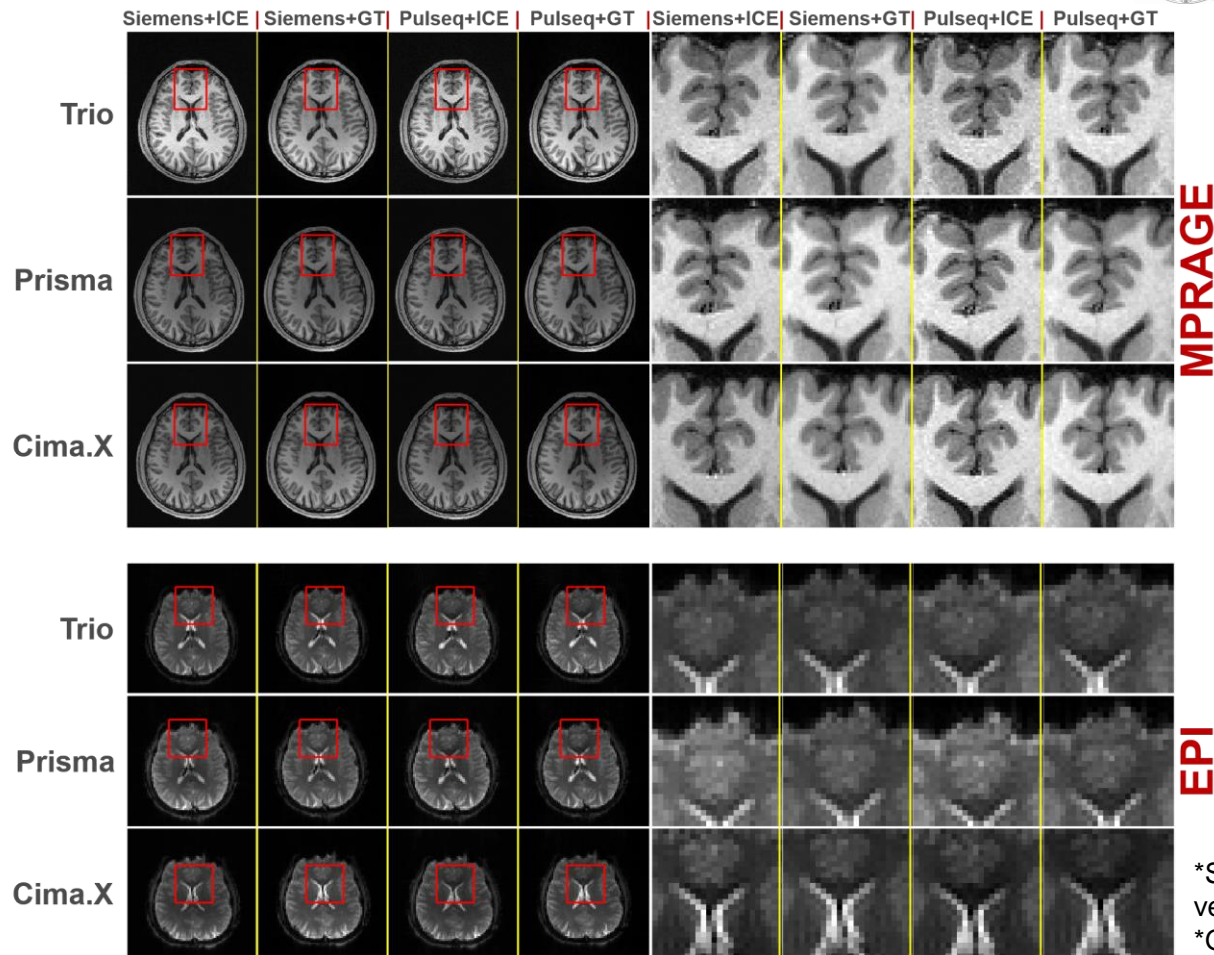


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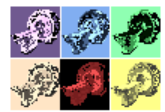
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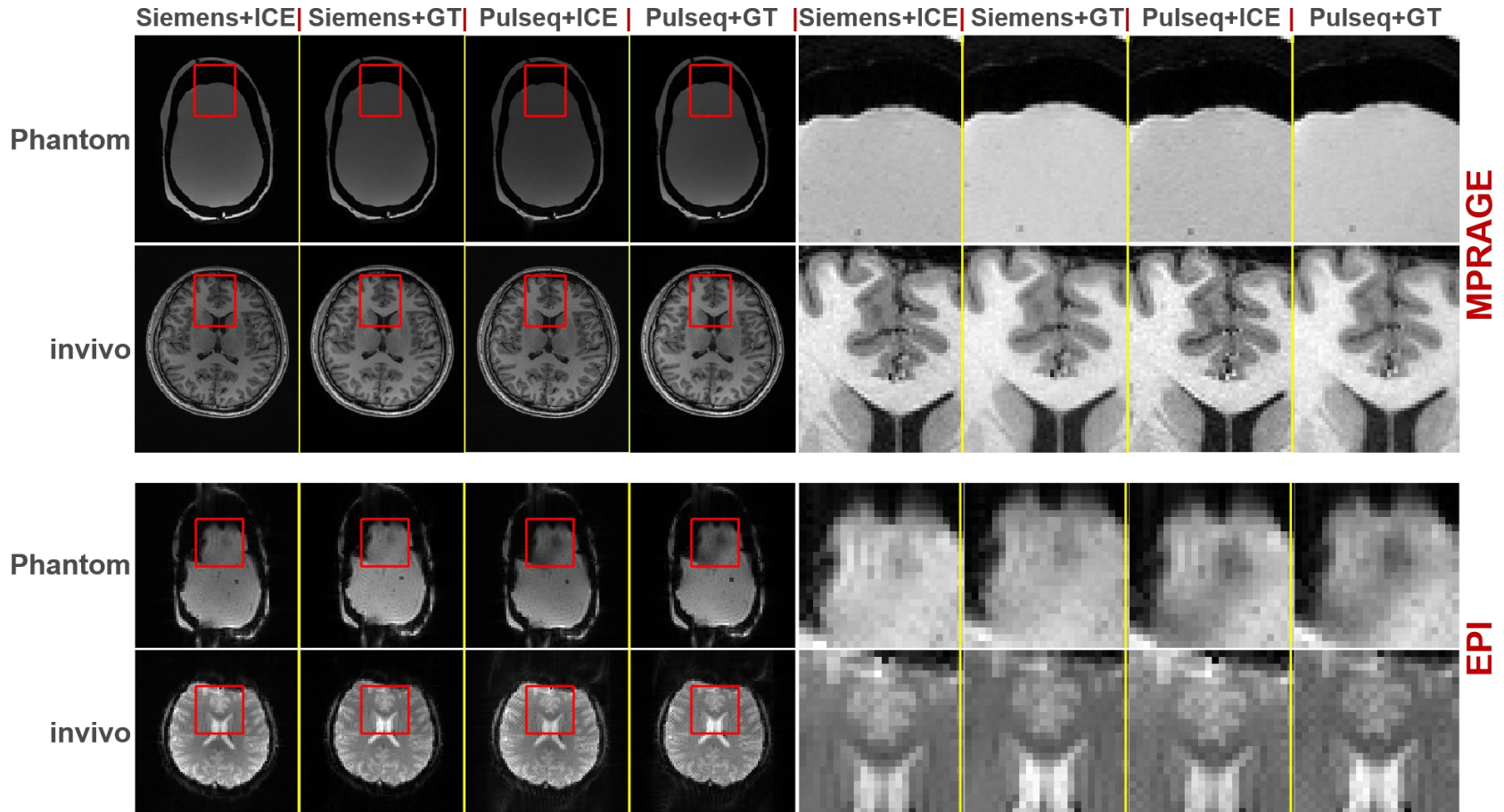
Results: @Siemens, Boston

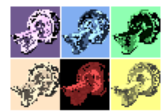


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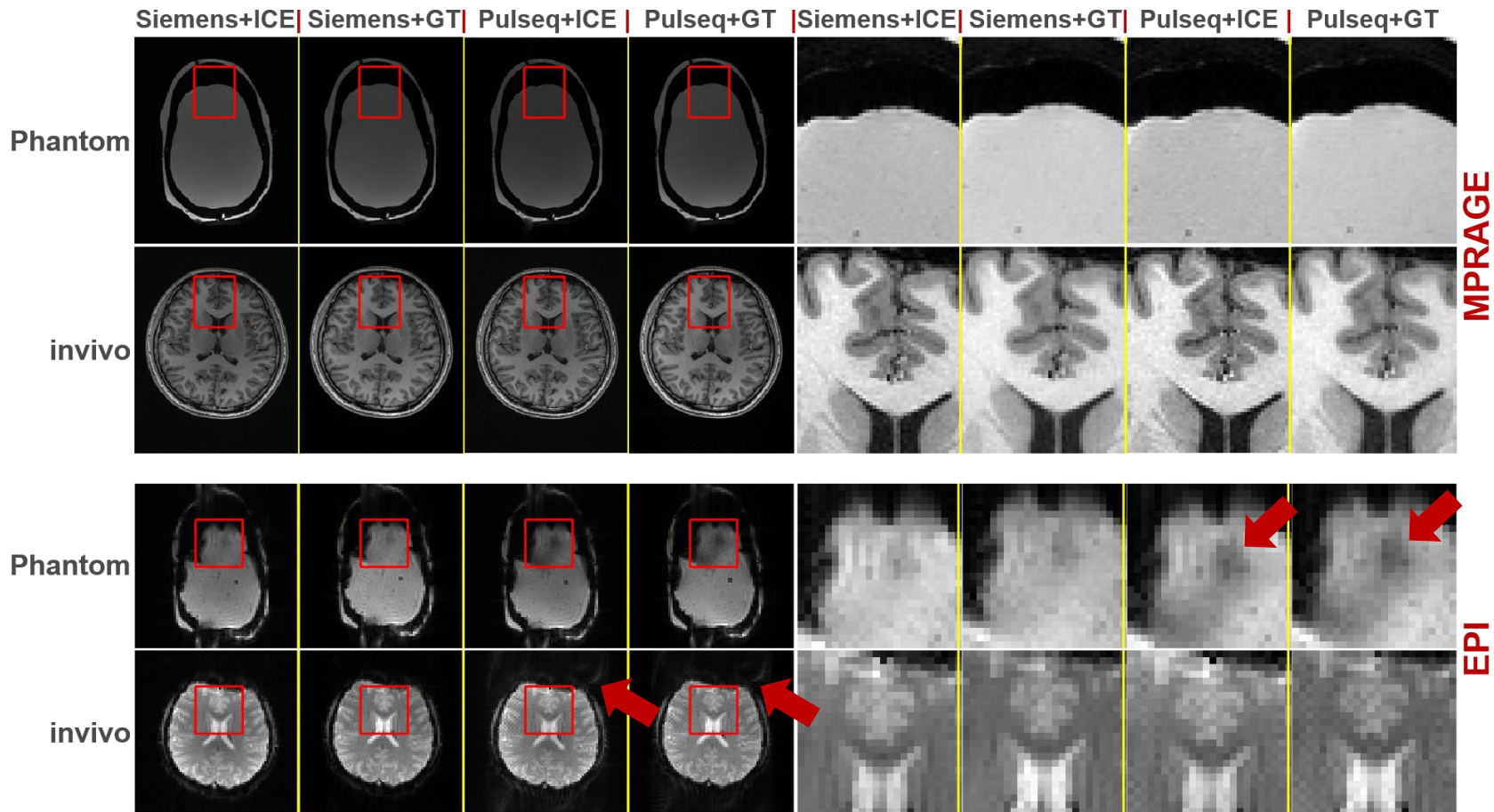
Results: @Siemens, Boston



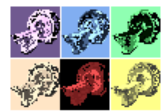
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Slide 10 *GT = Gadgetron, Siemens = vendor-based sequence



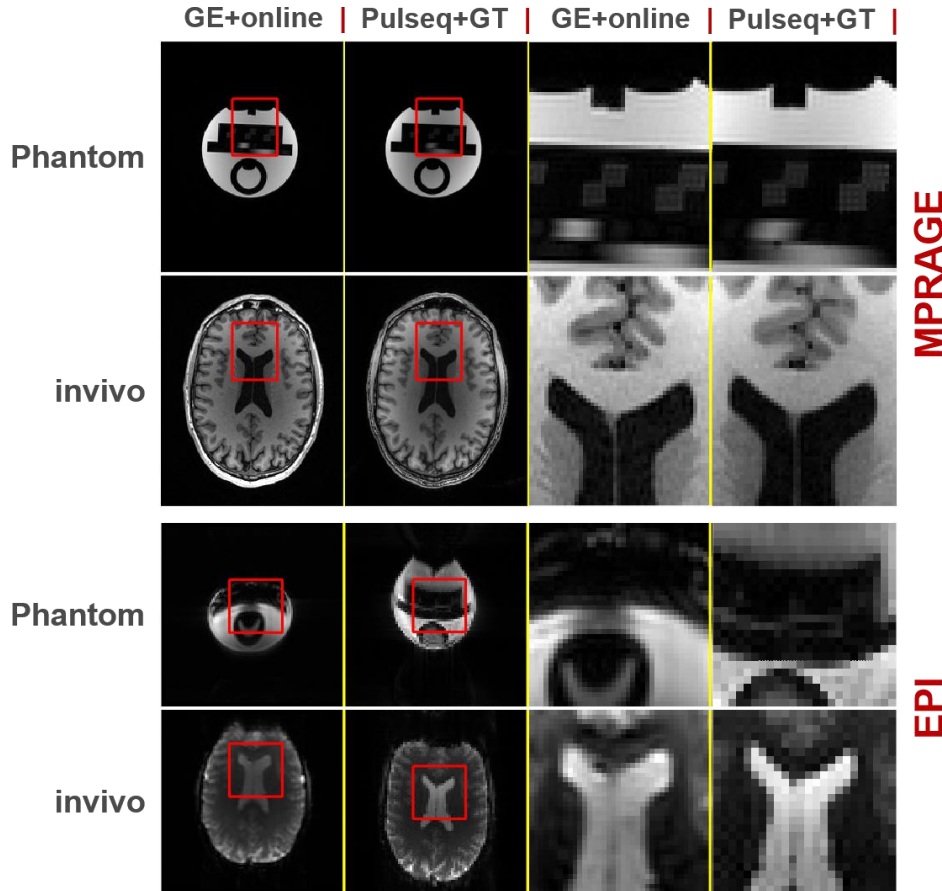
Results: @GE, Michigan



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MPRAGE:

GE: 256*256*192

Pulseseq: 256*240*192

EPI:

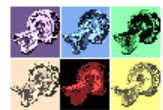
GE: 128*128*48 (Interpolated)

Pulseseq: 80*80*48

GE = GE-provided sequence

GT = Gadgetron

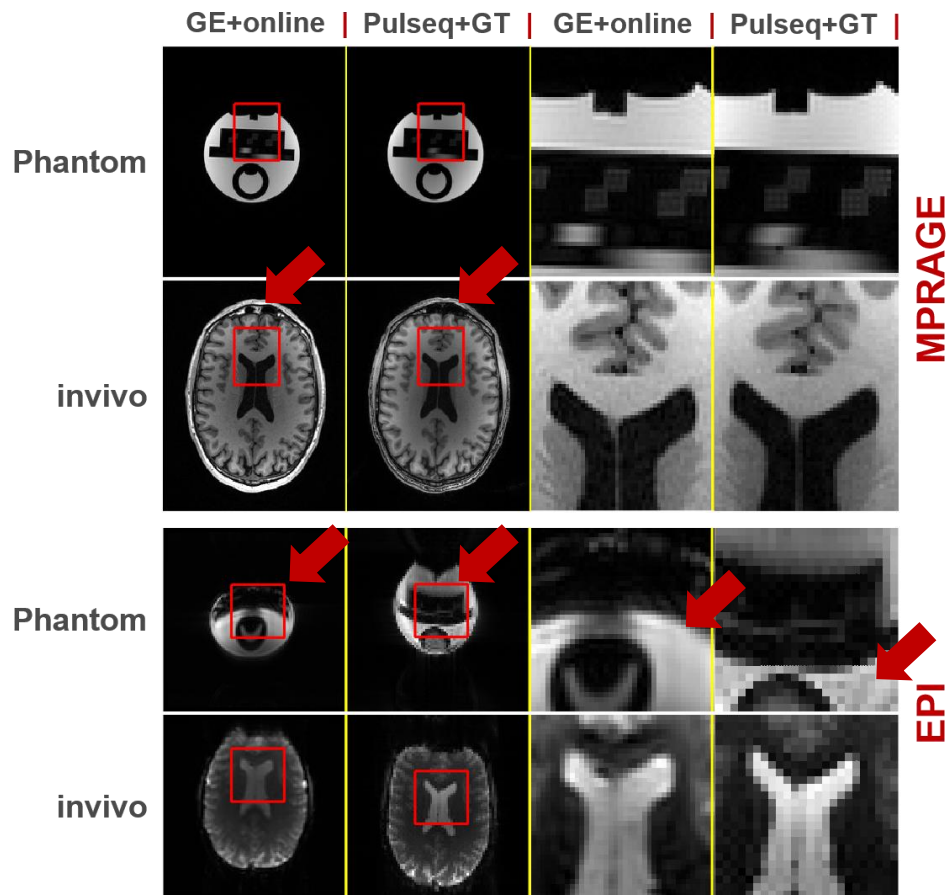
online = GE-provided online recon



Results: @GE, Michigan



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MPRAGE:

GE: 256*256*192

Pulseseq: 256*240*192

EPI:

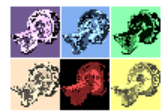
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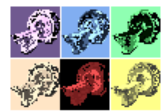
online = GE-provided online recon



Conclusion



- **Successful replication**
 - across system versions ✓
(VB17A, VE11C, XA30A, XA60A, XA61A)
 - across research centers ✓
(Freiburg, Boston, Michigan)
 - across vendors (Siemens, GE) ✓
 - Learned a lot about different systems and setups



References

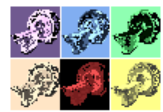


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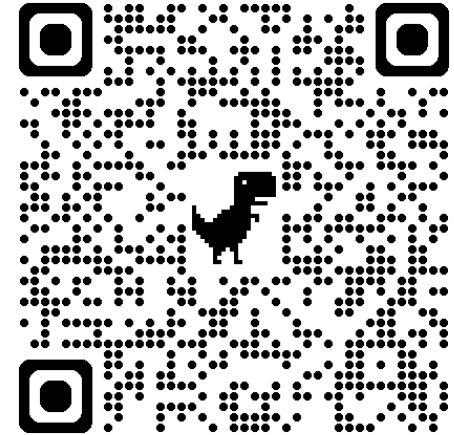
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