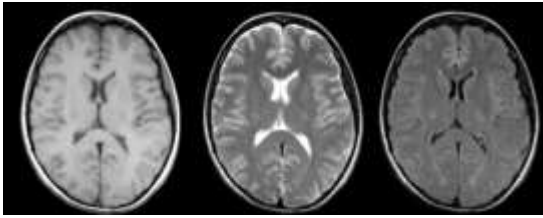


Maschinelles Lernen in der MR Bildrekonstruktion

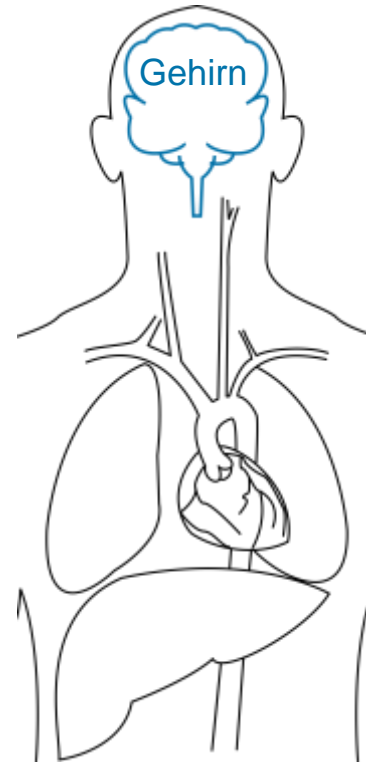
Qualität von KI messbar und vergleichbar machen: Beispiel Medizin

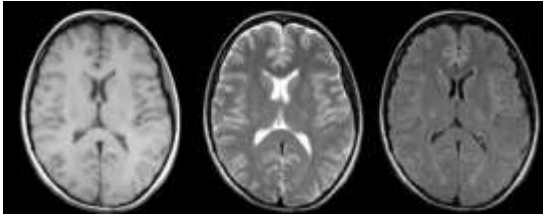
Dr. Christoph Kolbitsch

Physikalisch-Technische Bundesanstalt (PTB), Quantitative MRT

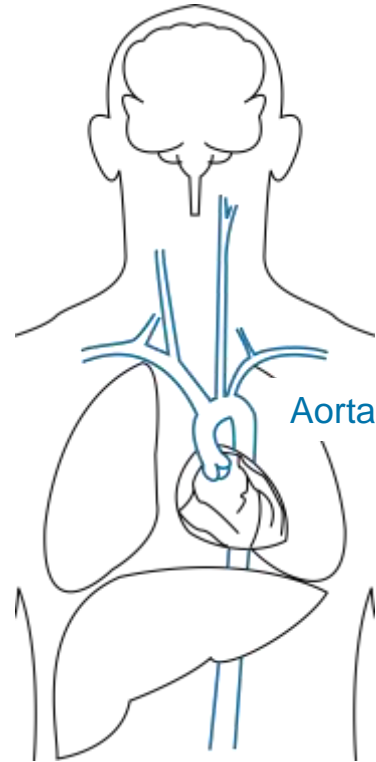


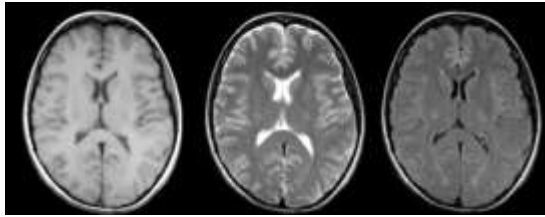
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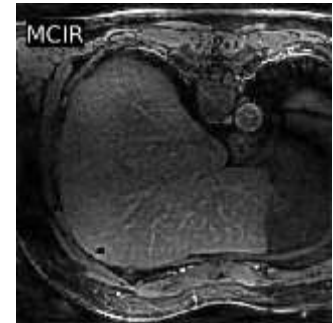
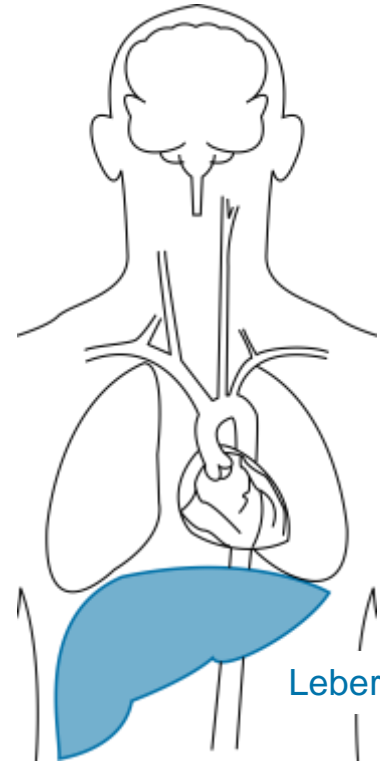


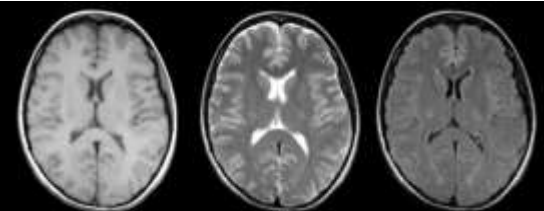
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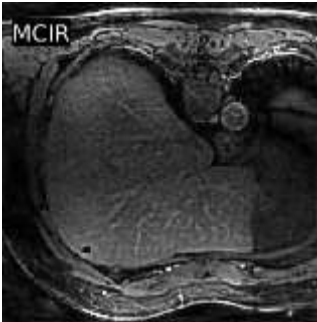
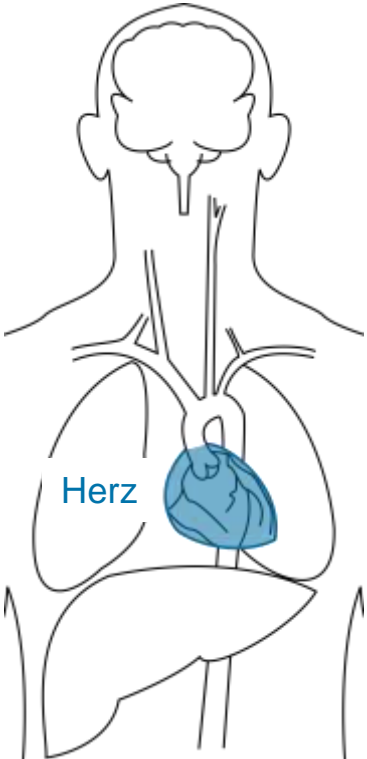
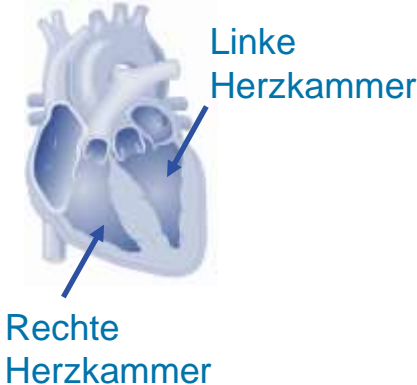
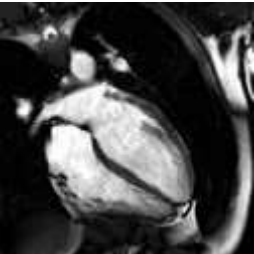
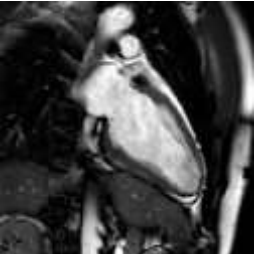


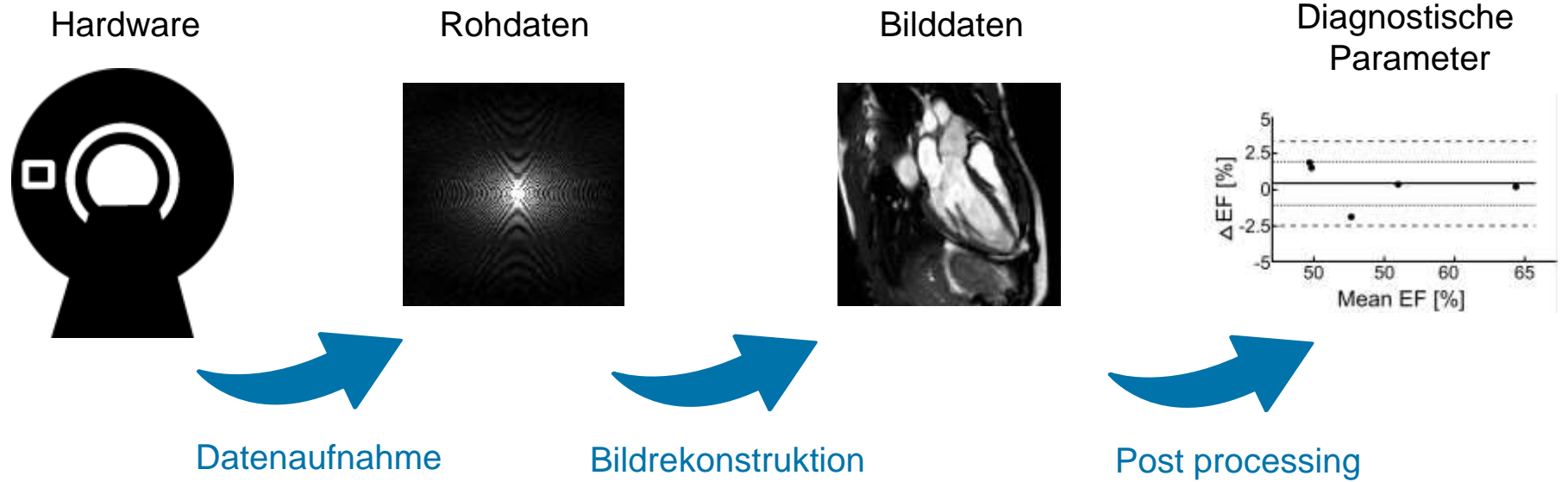
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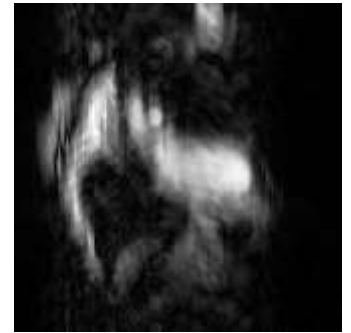
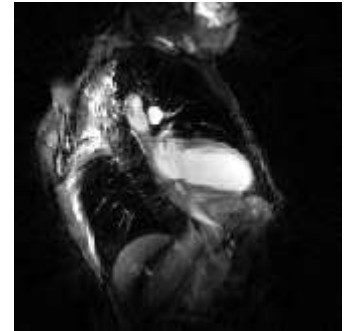
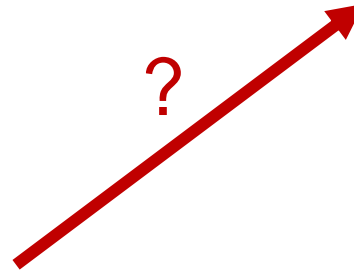
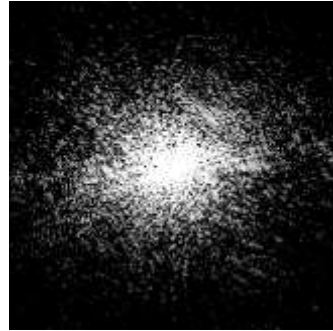


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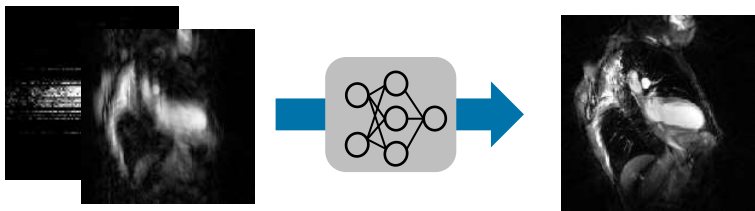




- Kürzere Scanzeit
- Höhere Auflösung
- Mehr diagnostische Information
- ...

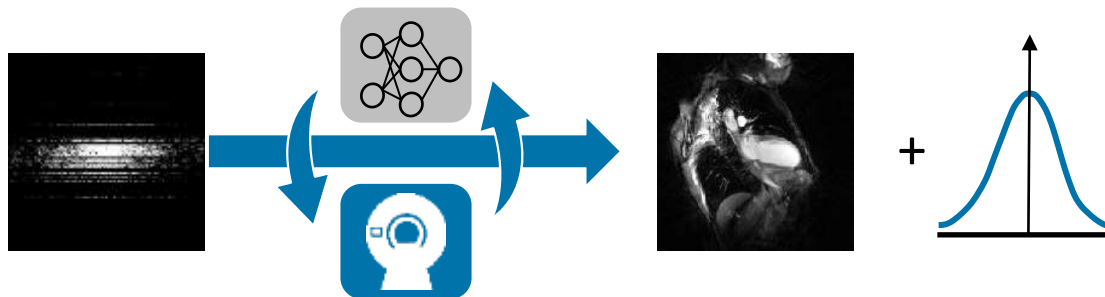


Reine netzwerkbasierte Rekonstruktion



- Große Netze
- Schwer zu trainieren
- Nicht überprüfbar
- Nicht nachvollziehbar (black box)

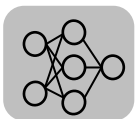
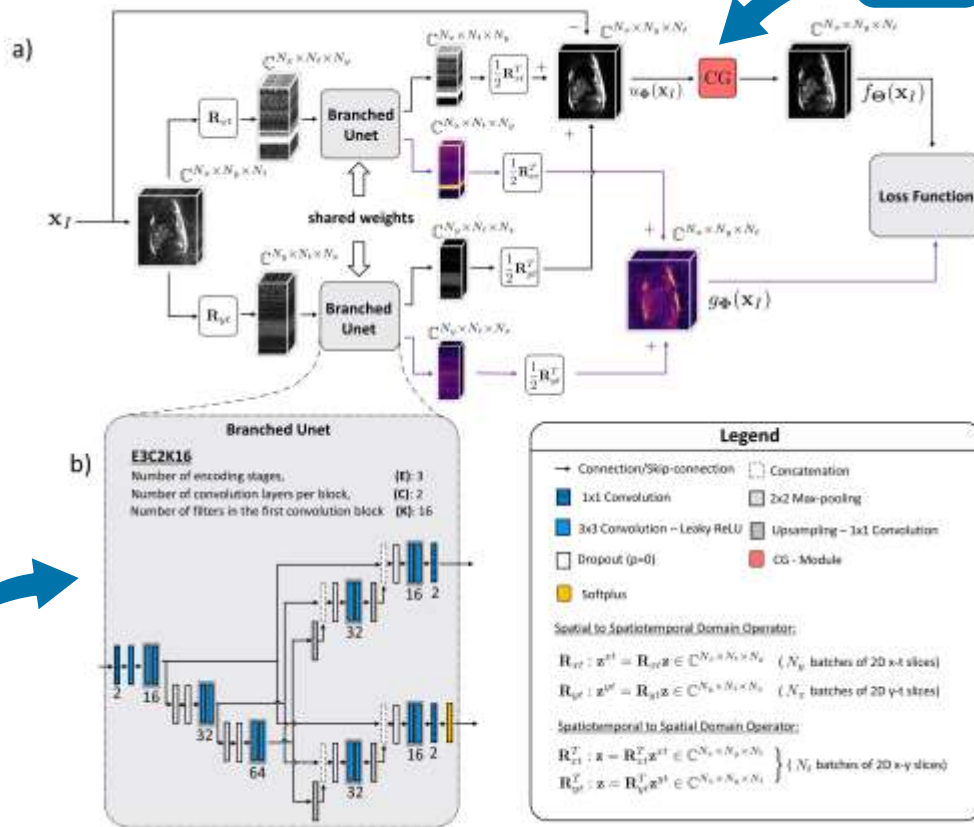
Physics-informed deep learning

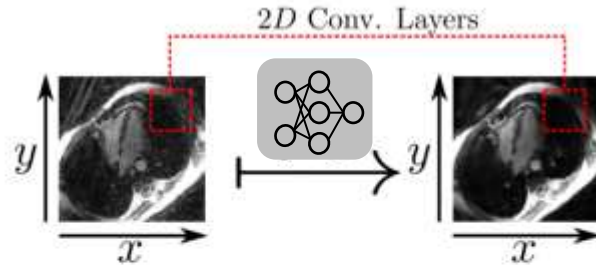
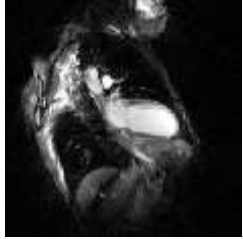


- Effizientes Training
- Robust durch physik. Modell
- Interpretierbar
- Unsicherheitsinformation



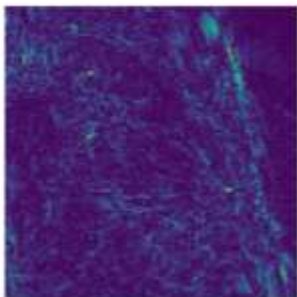
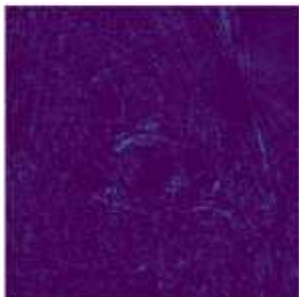
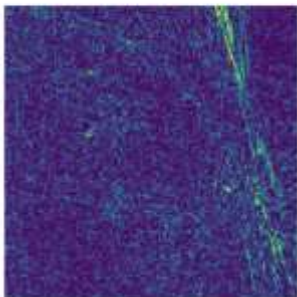
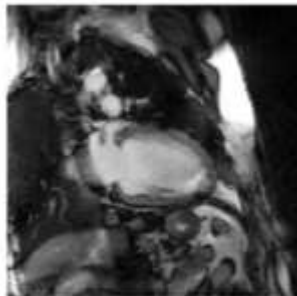
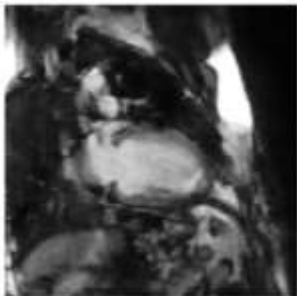
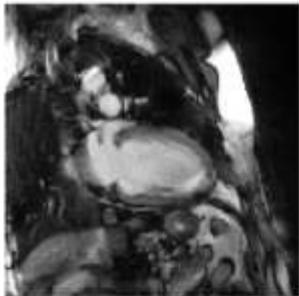
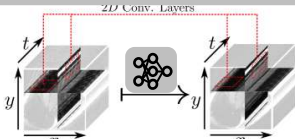
- Rohdaten
- MR Signalmodell
- Modell der Datenaufnahme
- Spulengeometrie
- ...





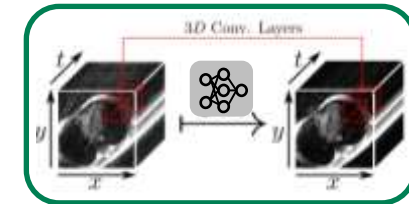
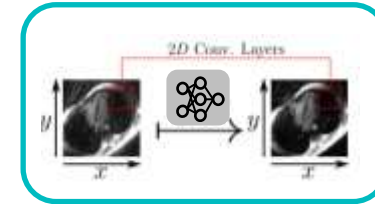
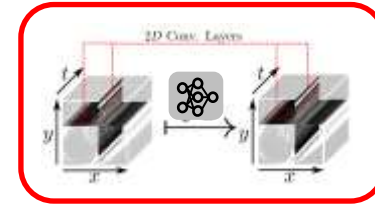
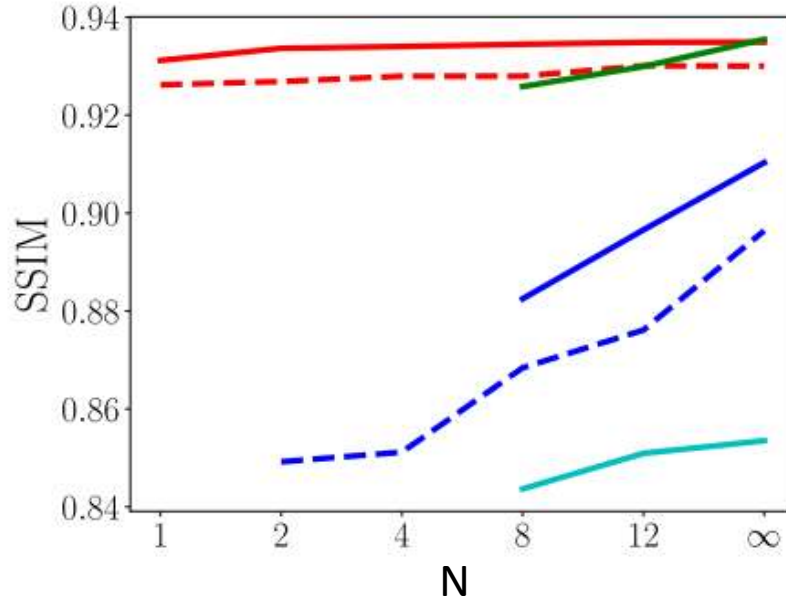
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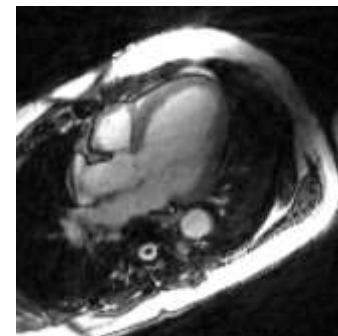
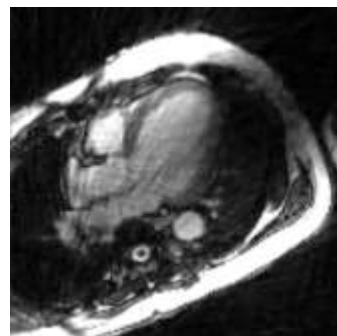
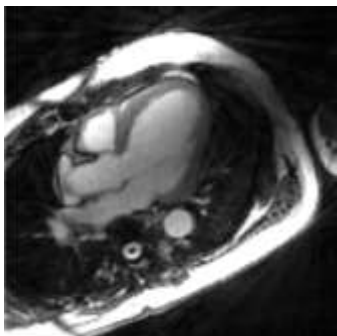


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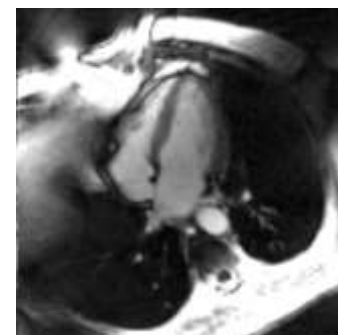
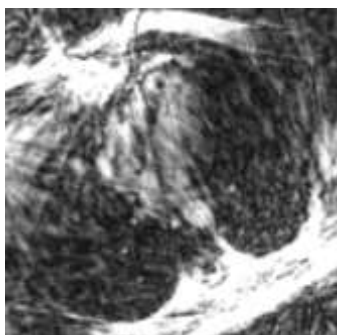
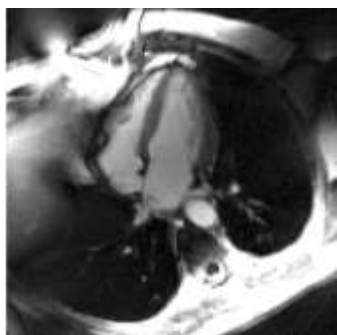
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Patient A

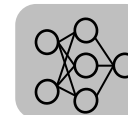
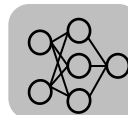


Patient B

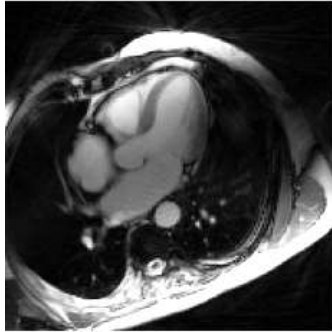


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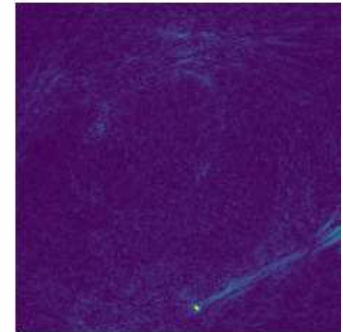
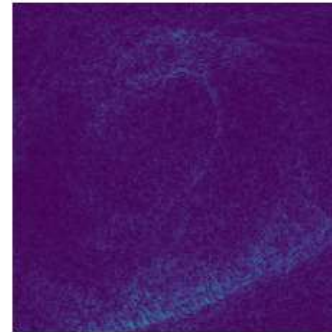
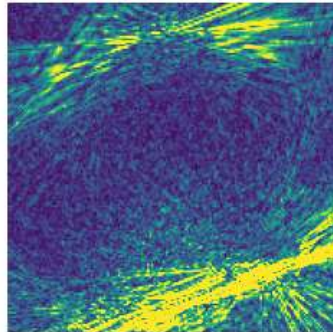
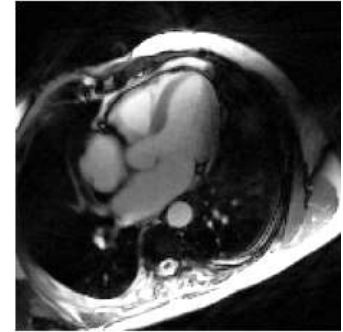
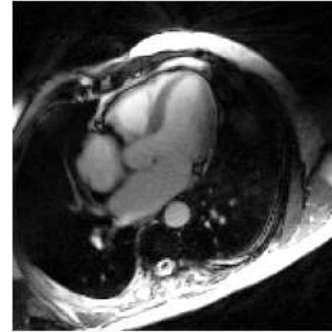
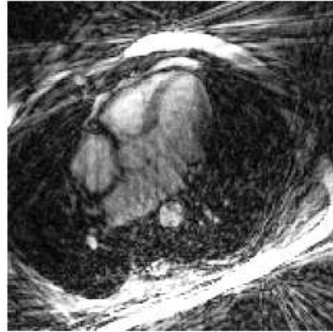
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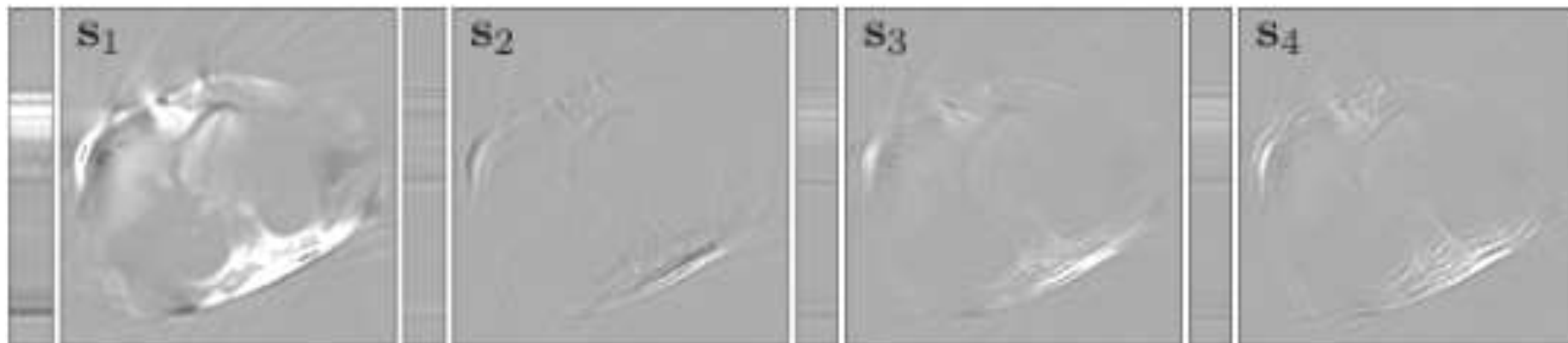
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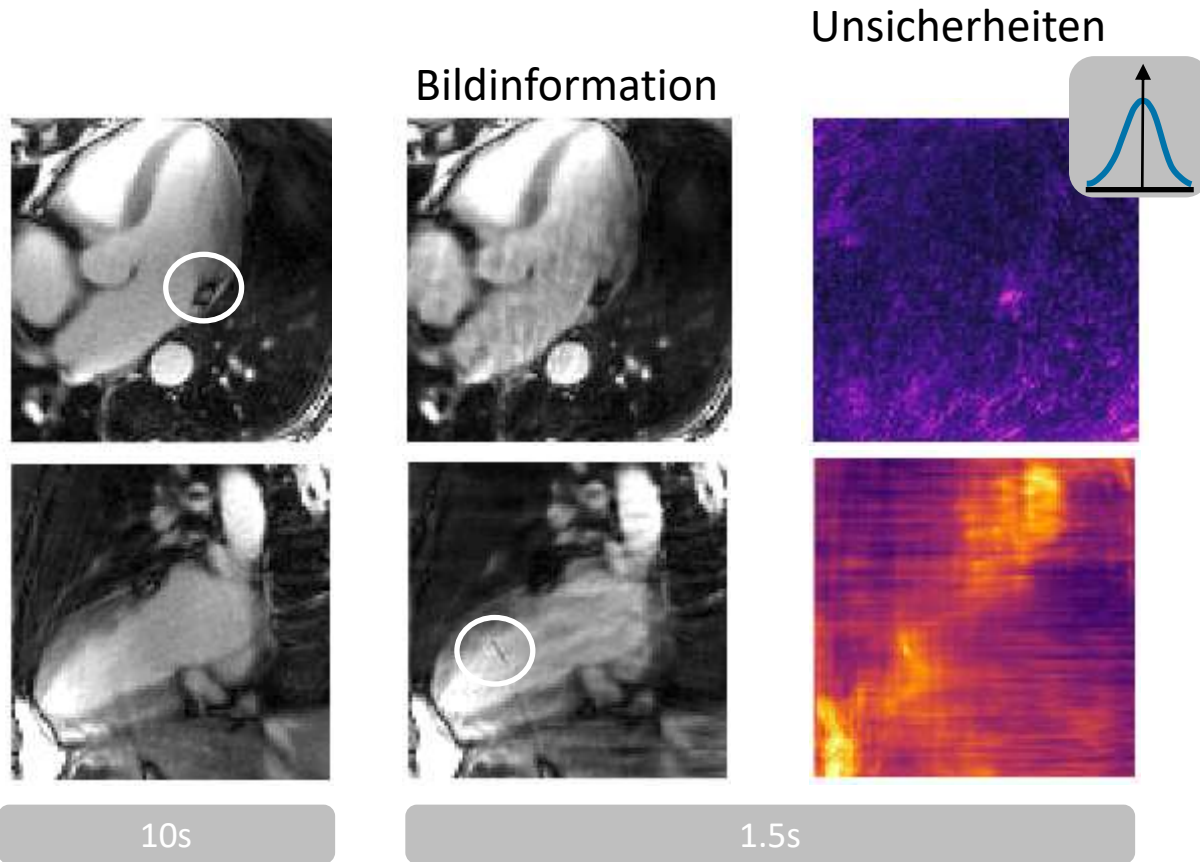


Anzahl an trainierbaren
Parametern

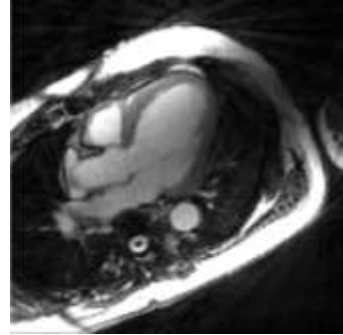
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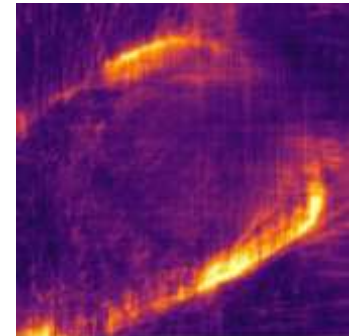
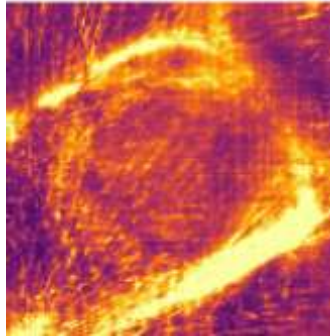
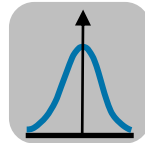
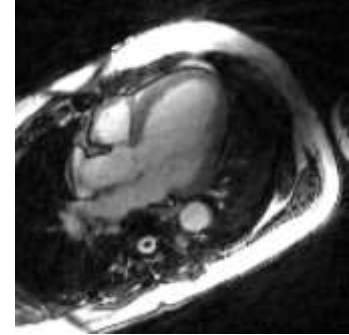
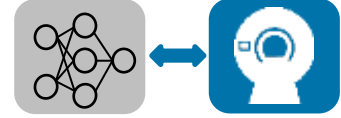
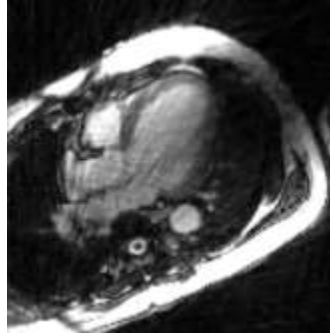
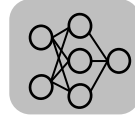
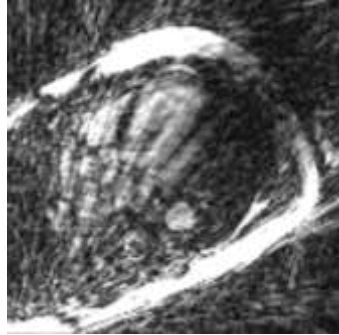




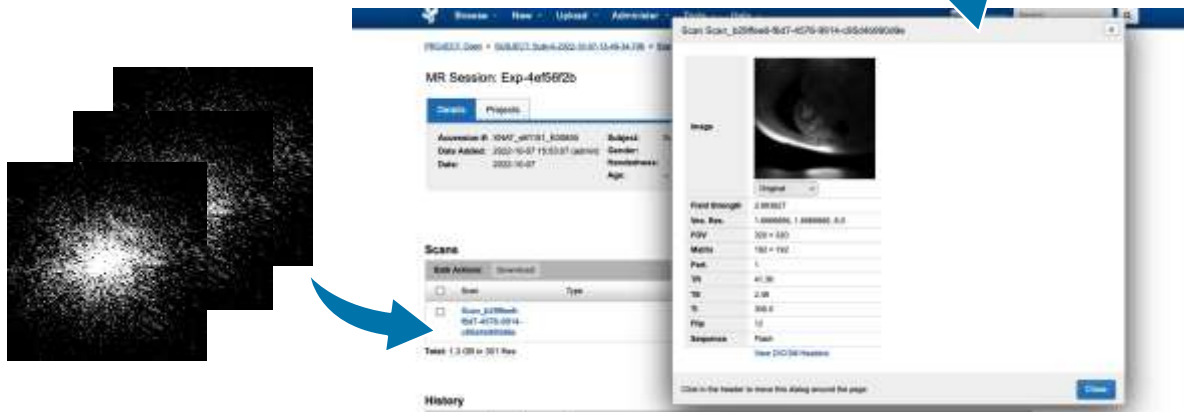
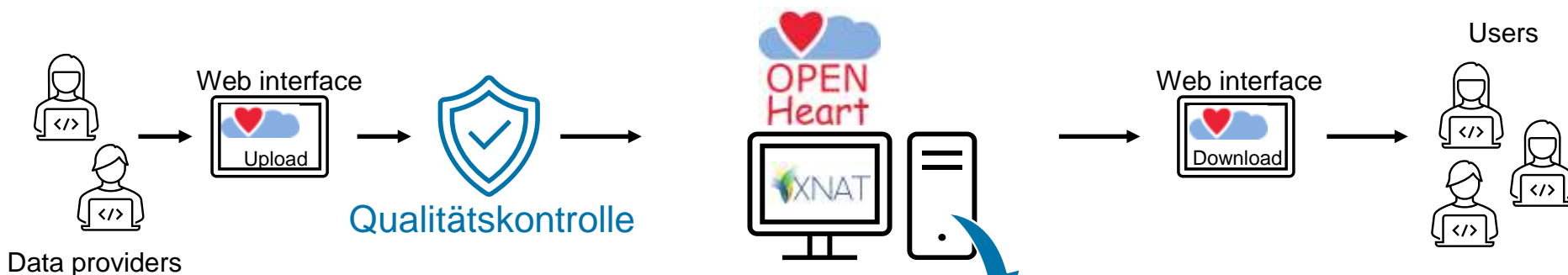
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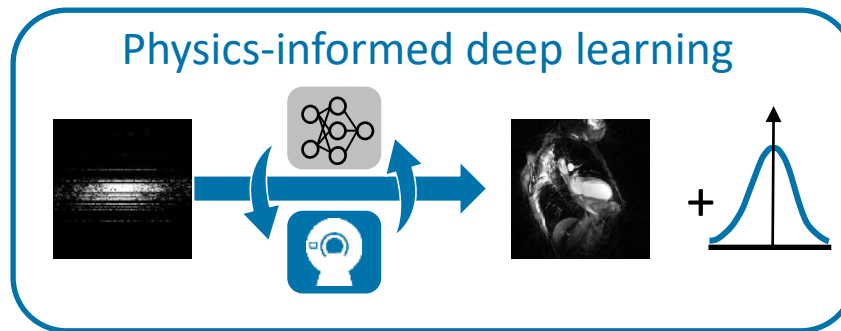


1.5s



Open access repository for cardiac MR raw data





Robust

Physikalische Modelle stabilisieren Netzwerke.

Interpretierbar

Parametrisiertes Netz liefert Einblicke in das Netzverhalten.

Quantifizierbar

Unsicherheitsanalyse liefert ein Maß für die Bildqualität.