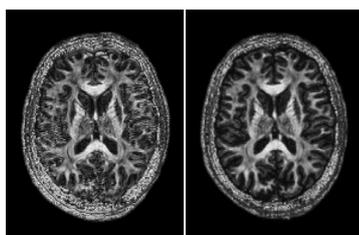


CONSISTENT DIFFUSION DATA WITH HIGHEST SNR REPRODUCIBLE RESULTS FROM YOUR MR SYSTEM

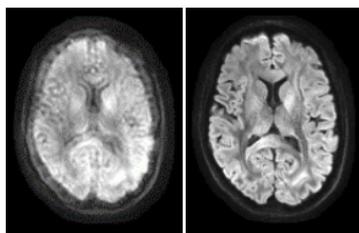


[1] single-shot EPI
without correction

single-shot EPI
with correction

Consistent MR data

A challenge in diffusion MRI is the varying distortions in the individual diffusion weighted images, which lead to a loss of resolution in combined images and incorrect quantitative diffusion values. Skope products allow you to significantly improve the geometrical consistency among these images by measuring the encoding fields with high fidelity and removing distortions with the skope-i software. The artifact-free images provide the basis for the calculation of quantitative diffusion parameters, even in multi-center settings.

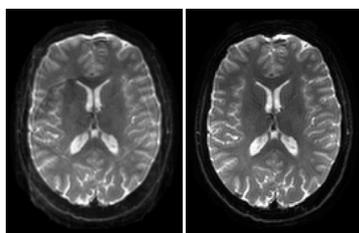


[2] single-shot spiral
without correction

single-shot spiral
with correction

Diffusion acquisition with highest possible SNR

The inherently low signal-to-noise ratio (SNR) in diffusion imaging limits the achievable image resolution and b-value. Skope technology allows you to choose sequences with the highest SNR. Reducing the achievable echo times, with the option to use Stejskal-Tanner diffusion encoding (instead of double refocused spin-echo) and spiral instead of EPI acquisition, will lead to the most SNR efficient acquisition. This facilitates higher image resolution, shorter scan durations and more reliable statistical analyses or diagnoses.



[1] single-shot EPI
without correction

single-shot EPI
with correction

Robust single-shot imaging

While single-shot EPI is highly robust against motion, it is susceptible to encoding deficiencies and suffers from a multitude of image artifacts. With the Skope technology, EPI becomes even more robust, facilitating single-shot imaging with highest anatomical fidelity. Single-shot spiral MRI with unprecedented quality becomes possible as well, allowing you to explore imaging with shortest possible echo times. These images will ultimately lead to repeatable results with higher sensitivity and specificity.

Clip-on Camera and skope-i | image production software

Performing accurate diffusion imaging with high resolution and achieving consistency among diffusion images is hindered by inaccurate image encoding by the MR system. These imperfections result in image distortions and other artifacts.

By measuring the image-encoding magnetic fields, the Clip-on Camera provides all the necessary information to correct for these problems while allowing for the most SNR-efficient acquisitions. Based on the measured field dynamics, our image reconstruction software skope-i produces consistent diffusion images for repeatable and reproducible diffusion MR studies.

Clip-on Camera

Physical dimensions of RF front end

| | |
|---------------------|-----------------------|
| Housing (w x d x h) | 24 cm x 20 cm x 13 cm |
| Cable diameter | 3 cm |
| Coaxial cables | custom fit, < 20 m |

NMR field probes

| | |
|-------------------------|------------------------|
| Coherence lifetime | 50 ms |
| Minimum repetition time | 3 x coherence lifetime |
| SNR·√BW | 65'000 |
| Achievable k_{max} | ±7800 rad/m |
| Probe cable length | custom fit, < 1 m |

Echo time (TE) shortening

| | |
|-----------------------------------|-----------|
| Reduction of TE in spiral vs. EPI | 20-30 ms* |
| Estimated signal gain | 20-40%** |

| | |
|---|-----------|
| Reduction of TE in Stejskal-Tanner vs. double refocused | 20-40 ms* |
| Estimated SNR due to shortened TE | 20-40%** |

*for typical imaging parameters

** for brain white matter at 3T

Camera Acquisition System

The signals of the Clip-on Camera are acquired by the 16-channel Skope Acquisition System and processed to provide field dynamics. Apart from scan planning, the user interface allows for easy visualization of gradient dynamics and k-trajectories, including tools for its analysis.

skope-i | image production software

The image reconstruction takes into account

- ▶ Measured/simulated gradient encoding
- ▶ Coil sensitivity information (SENSE)
- ▶ Static B_0 maps
- ▶ Higher order field evolution

Compiled for Windows

Supported sequences

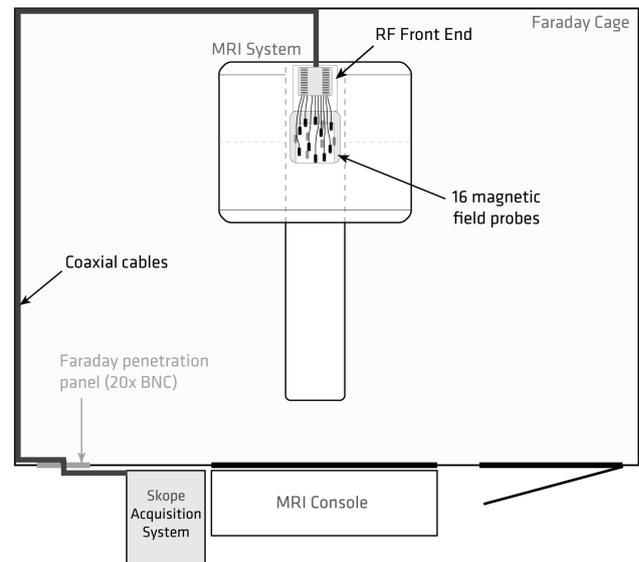
- ▶ DW single-shot spin-echo EPI/spiral
- ▶ GRE Cartesian/EPI/spiral

Publications related to initial research and employed MR images:

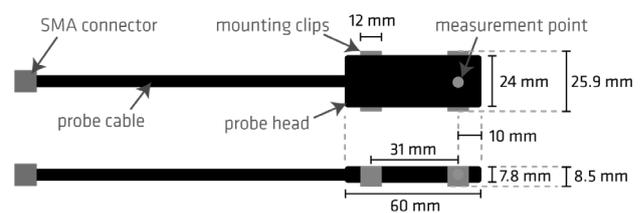
[1] Diffusion MRI with concurrent magnetic field monitoring. MRM: 2015.

[2] Single-shot spiral imaging enabled by an expanded encoding model. Demonstration in diffusion MRI. MRM: 2016.

Clip-on Camera Site Overview



Clip-on Camera probe



skope-i reconstruction pipeline

