

1 | SUPPLEMENTARY MATERIALS

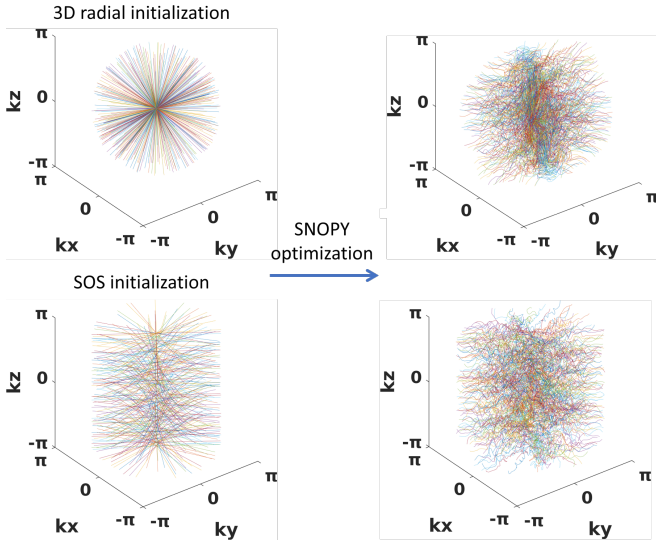


FIGURE S1 Experiment 3.2.1 with two types of initialization.

1.1 | Different initializations

SNOPY solves a nonconvex optimization problem, the quality of its results is influenced by initialization. Supplementary to experiment 3.2.1, we compared different initialization trajectories, including stack-of-stars (SOS) and 3D radial, as illustrated in Fig. S1. The number of readout points, as well as training configurations, were kept constant for both initialization methods. The average PSNR on the test set was 32.4 dB for the optimized trajectory using 3D radial initialization, and 34.8 dB for the optimized trajectory using SOS initialization.

1.2 | Weight combinations

This supplementary experiment tested 4 different settings of experiment 3.2.3 to showcase the impact of different weight combinations, including

$$\mathcal{L} = 10^{-2}\mathcal{L}_g + 10^{-2}\mathcal{L}_s + 10^{-3}\mathcal{L}_{pns} + 10^2\mathcal{L}_c,$$

$$\mathcal{L} = 10^{-2}\mathcal{L}_g + 10^{-2}\mathcal{L}_s + 10^{-2}\mathcal{L}_{pns} + 10^2\mathcal{L}_c,$$

$$\mathcal{L} = 10^{-2}\mathcal{L}_g + 10^{-2}\mathcal{L}_s + 10^{-1}\mathcal{L}_{pns} + 10^2\mathcal{L}_c,$$

and

$$\mathcal{L} = 10^{-2}\mathcal{L}_g + 10^{-2}\mathcal{L}_s + \mathcal{L}_{pns} + 10^2\mathcal{L}_c.$$

Fig. S2 displays the optimized sampling trajectory and the corresponding PNS calculation. A higher weight of \mathcal{L}_{pns} led to better adherence to the PNS constraint.

1.3 | Gradient and slew rate profile

Fig. S3 plots the gradient and slew rate of the trajectory jointly optimized with MoDL in experiment 3.2.1

1.4 | Rotation angles

Fig. S4 plots the rotation angles before and after optimization in experiment 3.2.2



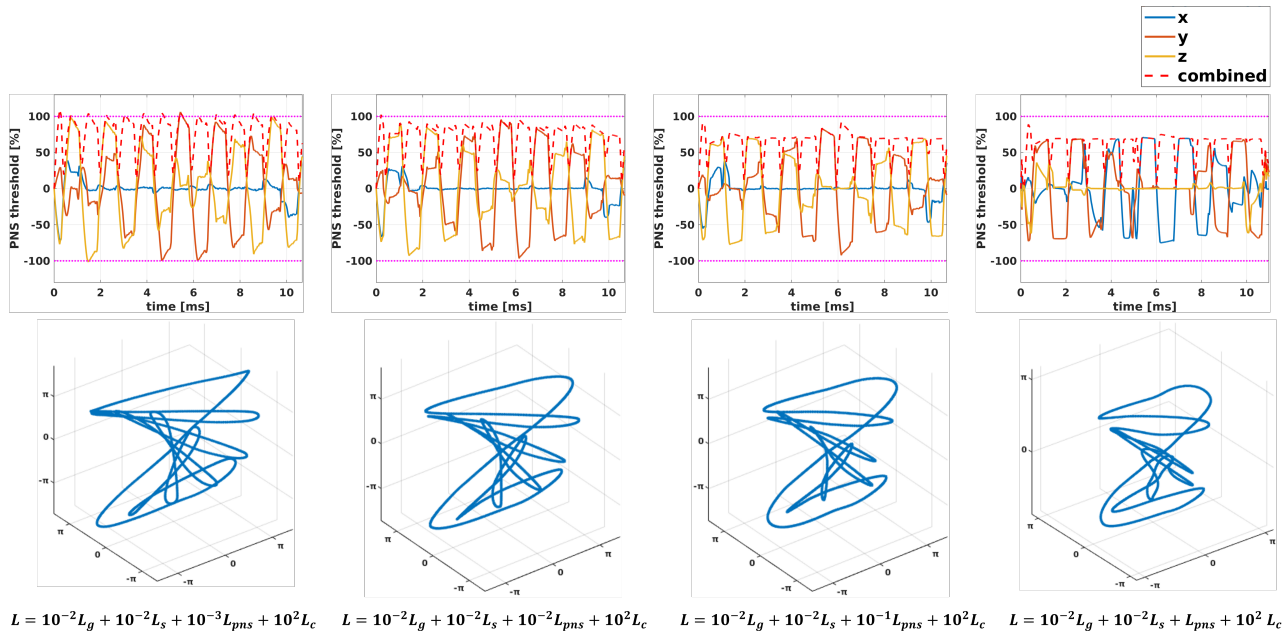


FIGURE S2 Examples of experiment 3.2.3 optimized by training losses with different weight combinations. The first row of figures shows the PNS effect calculated by the convolution model. The second row depicts the optimized trajectory.

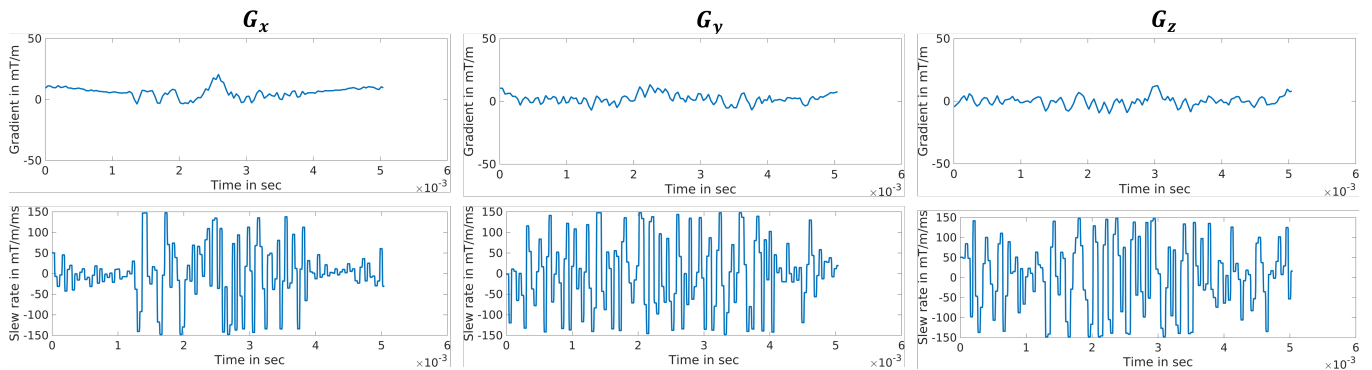
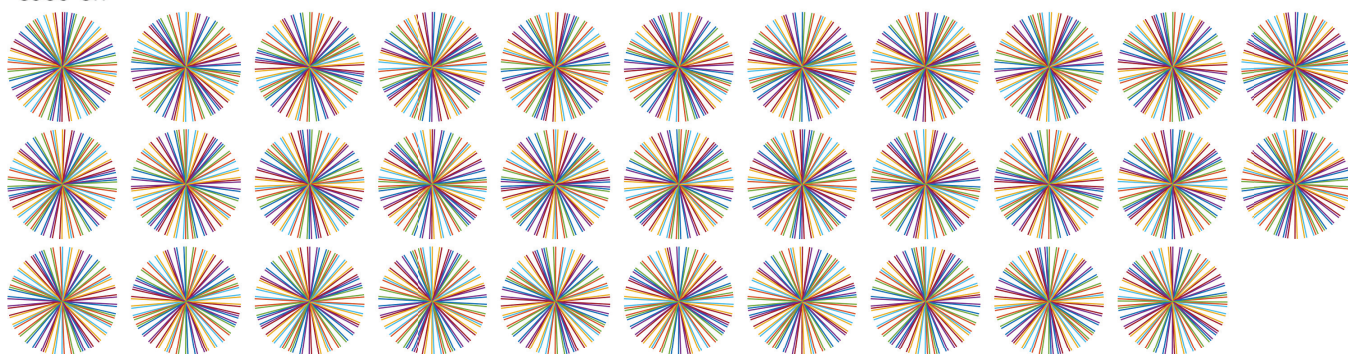


FIGURE S3 Profile of gradient strength and slew rate for one shot in experiment 3.2.1.

GSOS-GR



SNOPY-optimized

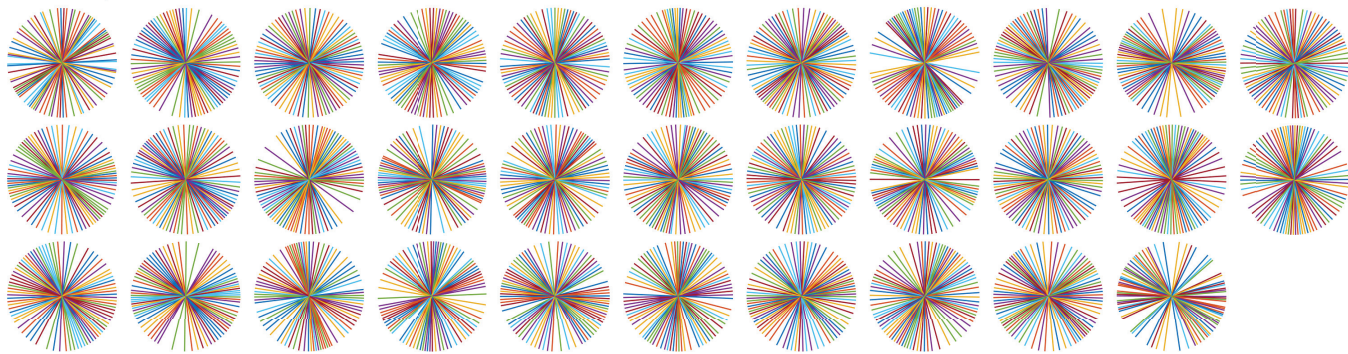


FIGURE S4 Sampling trajectories in experiment 3.2.2. Each figure shows an inplane ($k_x - k_y$) sampling trajectory for a k_z location.