

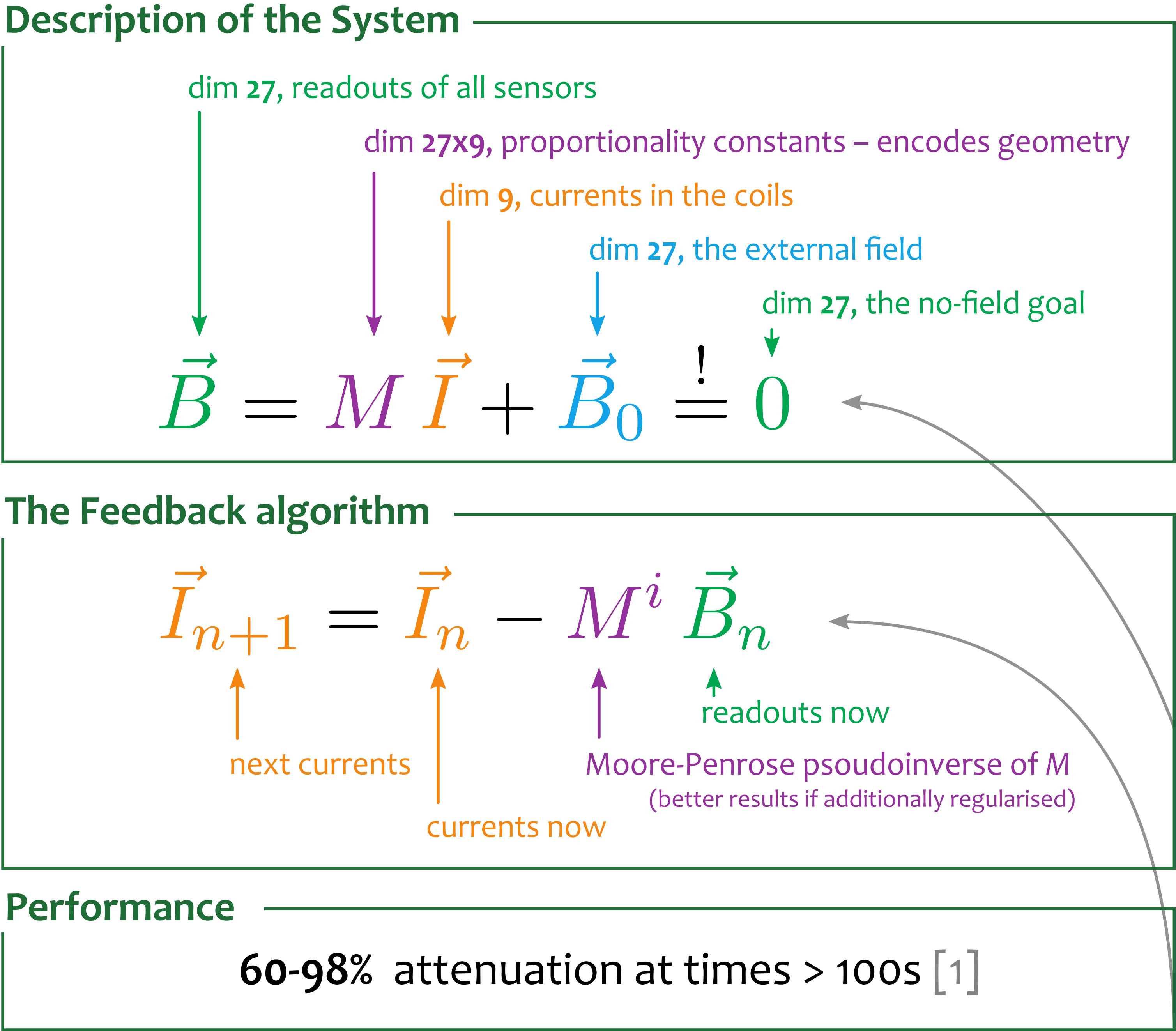
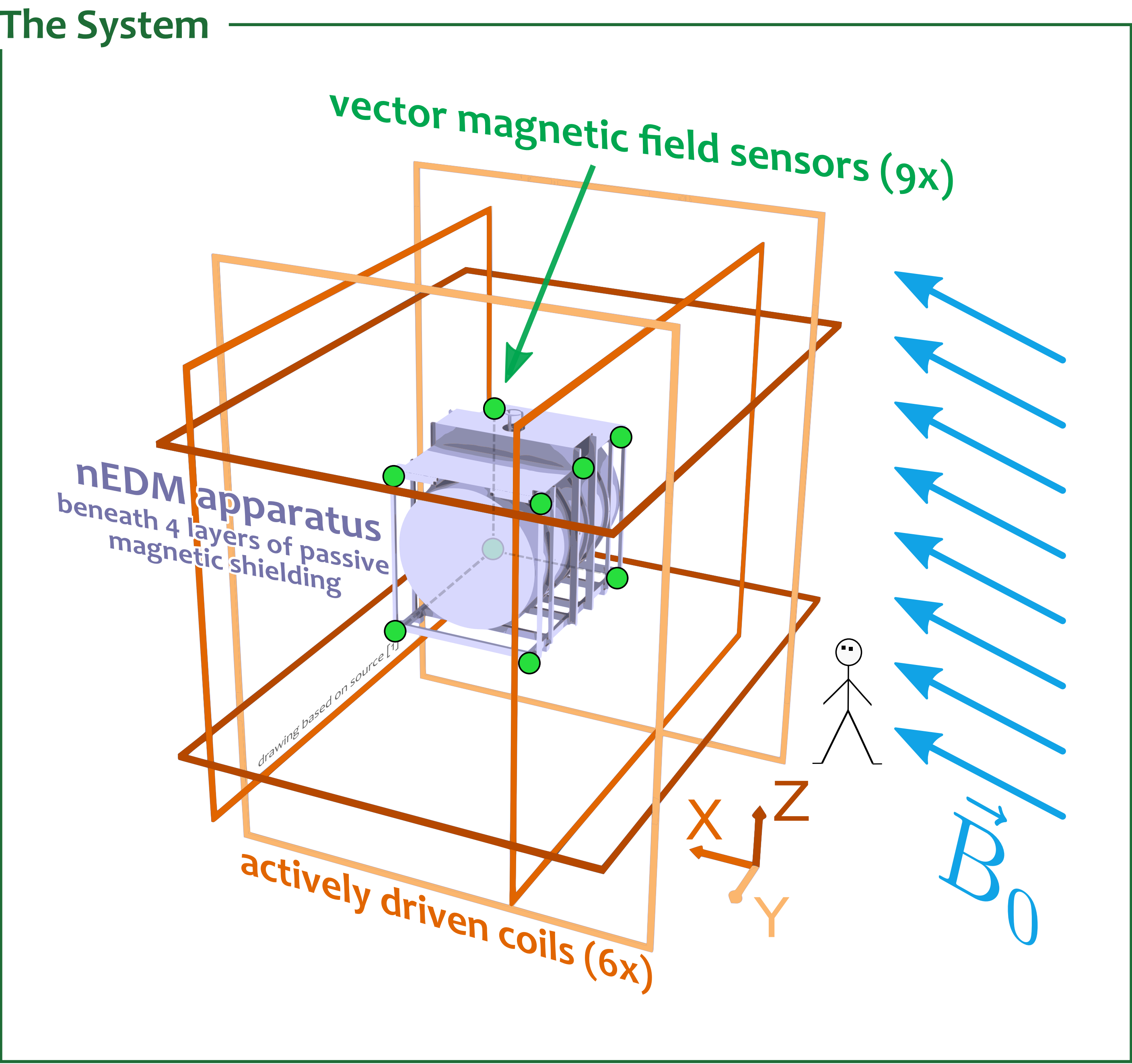
# Active stabilisation of a magnetic field for the nEDM experiment at PSI

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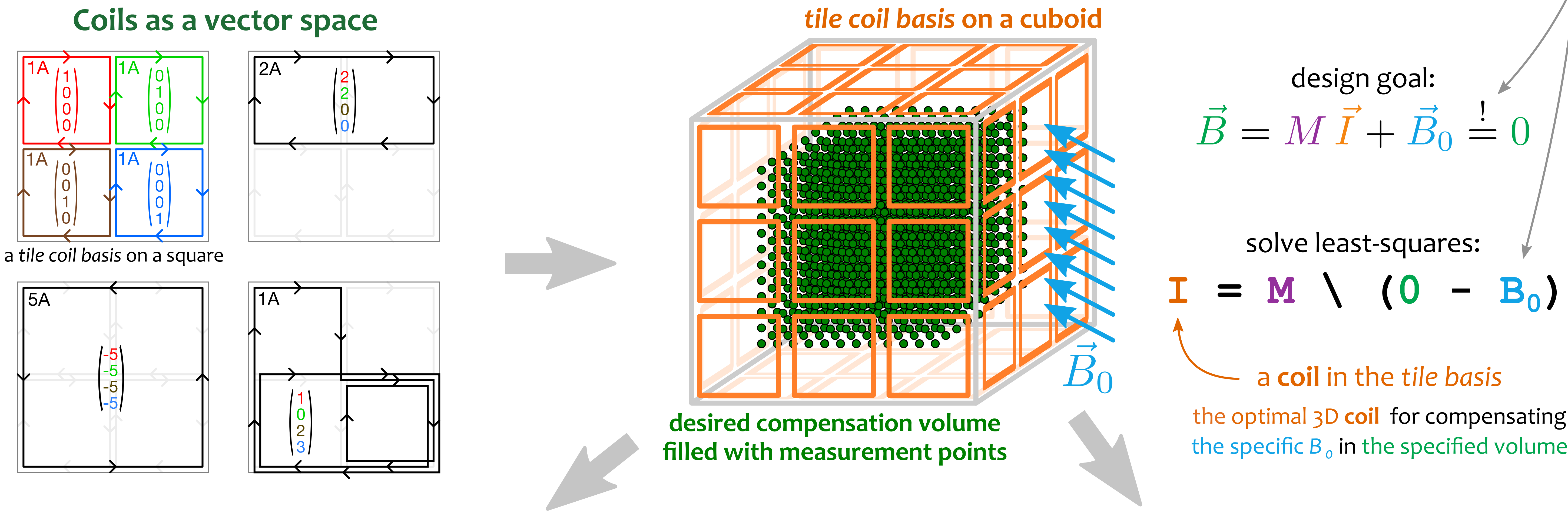
on behalf of the nEDM collaboration  
at the Paul Scherrer Institute in Switzerland

Measurements of the electric dipole moment of the neutron (nEDM) provide stringent limits on various standard model extensions. The main challenge in these measurements is reaching a magnetic field stability on the picotesla level. The stability may be greatly improved by putting the apparatus in the middle of a coil system that actively counteracts magnetic disturbances. A new stabilisation system is being designed, with an unprecedented size of the stabilised volume.

## The present nEDM active stabilisation system

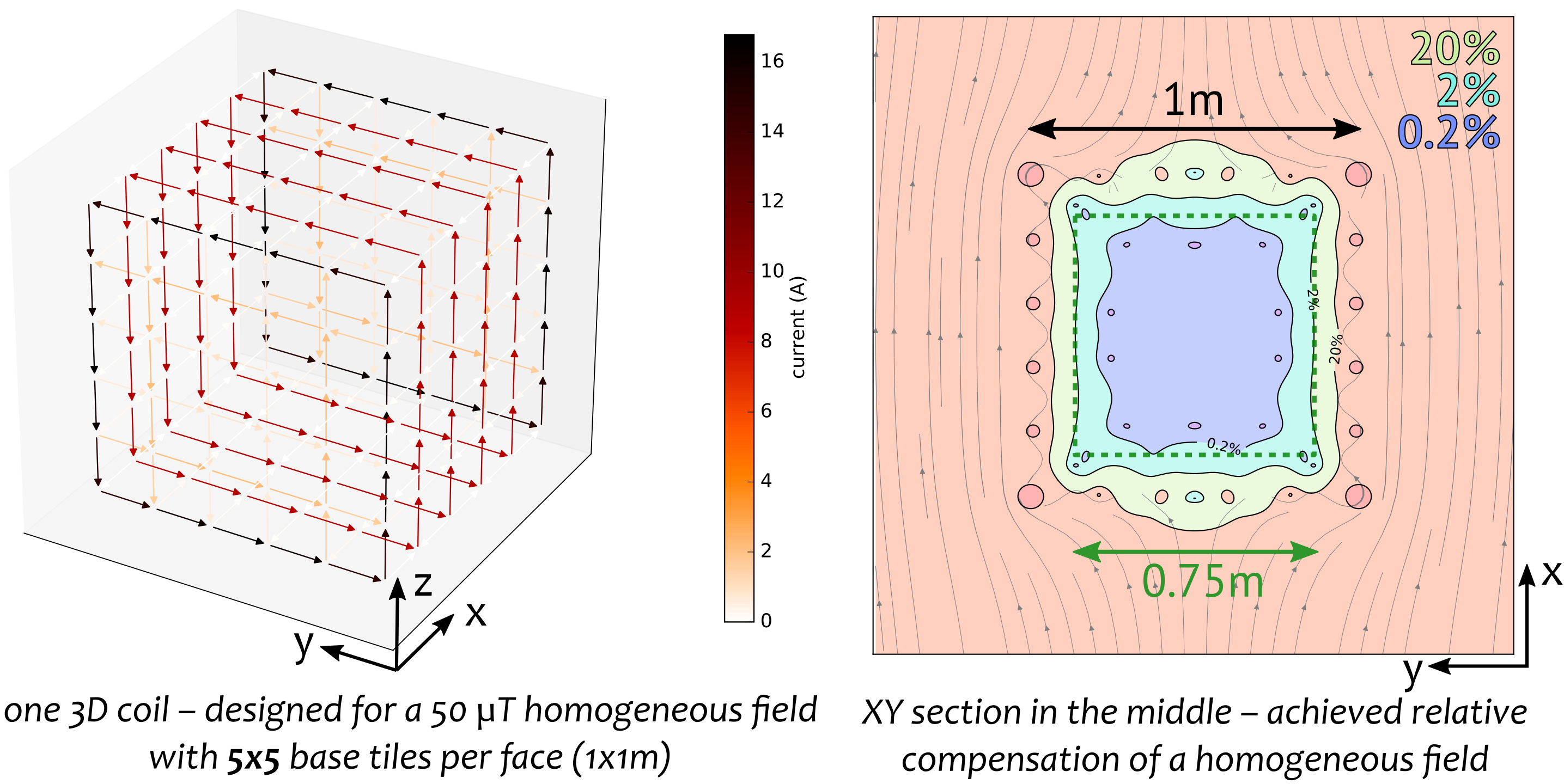


## Next generation system - coils design with large compensation volume



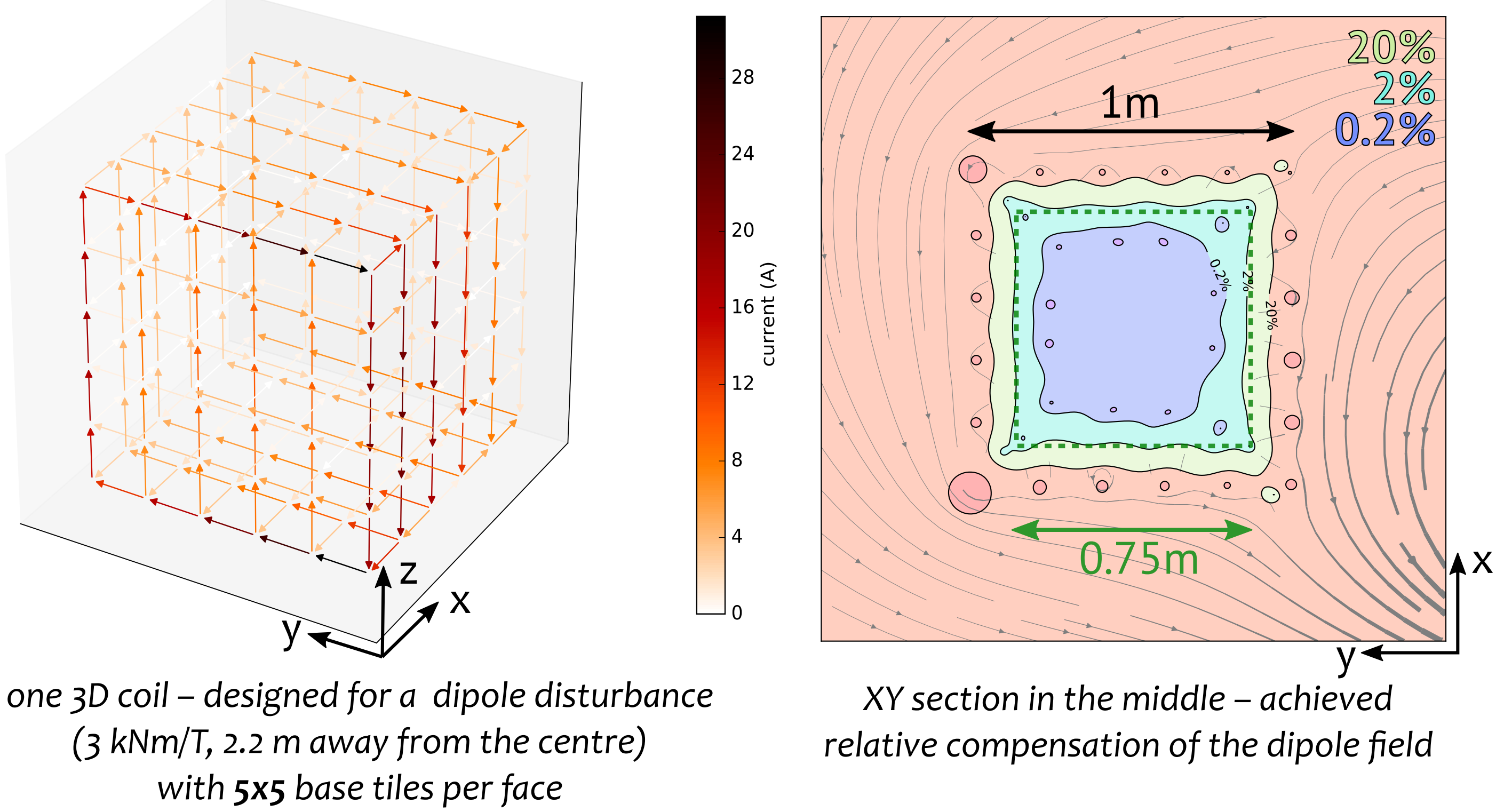
### Example 1: $\vec{B}_0$ = homogeneous field

< 2%-level compensation volume 12 times larger compared to a Helmholtz-pair [2]



### Example 2: $\vec{B}_0$ = arbitrary dipole

design of coils dedicated to known sources in the experimental hall



[1] S. Afach, et al. “Dynamic stabilization of the magnetic field surrounding the neutron electric dipole moment spectrometer at the Paul Scherrer Institute” J. Appl. Phys. 116, 084510 (2014)  
[2] J. L. Kirschvink, “Uniform Magnetic-Fields and Double-Wrapped Coil Systems - Improved Techniques for the Design of Bioelectromagnetic Experiments” Bioelectromagnetics 13, 401–411 (1992)