## **Supplementary figure S1**

Figure S1: Axial slices in the cervical spinal cord with diffusion gradients b=3000 s/mm² both perpendicular to the longitudinal axis of the cord (top), showing a lot of signal remaining and b) parallel to the cord (bottom), showing mainly noise. It demonstrates that the signal has been almost completely attenuated in the latter case, while it is well-above the noise floor in the former, in line with previously reported theoretical considerations (Grussu F et al, Magn Res Med 2019, doi: 10.1002/mrm.27463).

