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When the brain meets the sky: Compressed Sensing for Magnetic Resonance Imaging & Radio-Astronomy

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The discrete nature of radio interferometry measurements can be interpreted through the "Compressed Sensing''(CS) acquisition theorem, which supports the idea of using a specific mechanism, called sparsity, to reconstruct images from measured data called visibilities. In Magnetic Resonance Imaging (MRI), similar observations have been made leading to a new range of MRI imaging acquisition and reconstruction techniques. We will first briefly introduce CS and sparsity idea, then we will show how the resolution of a radio-astronomical image can improved by a factor four compared to the state-of-art. Then we will present new MRI acquisition schemes developed for the NeuroSpin MRI instrument which will achieve 11.7 tesla this year. Using such CS acquisitions,□ associated to our astrophysical reconstruction methods, allows a significant acceleration of the MRI acquisition time. We present results on real MRI measurements.

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