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Non-Uniform Sampling & Denoising applied to Nuclear Magnetic Resonance



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Context

Nuclear Magnetic Resonance



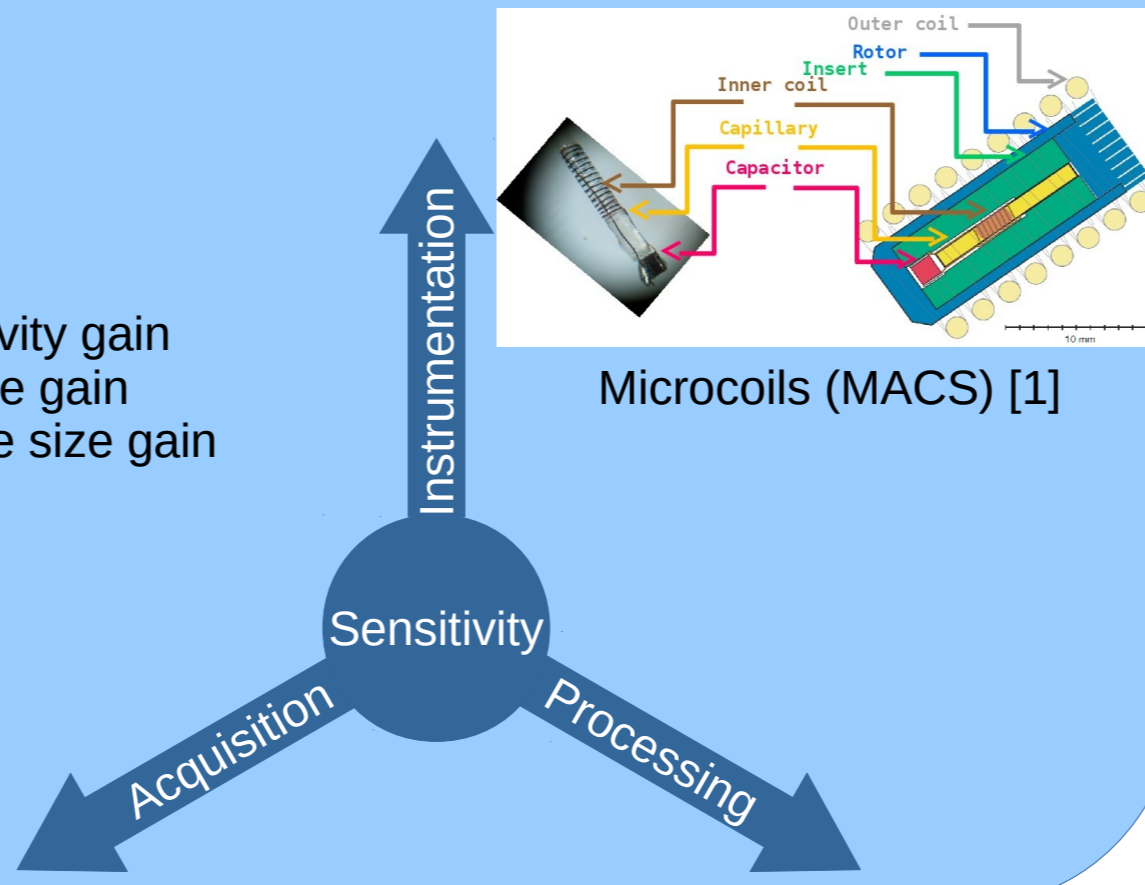
Physico-chemical spectroscopic analysis



Precise but poor sensitivity
100 mg of sample needed
Broad noisy peaks for distributed environments

Increasing sensitivity

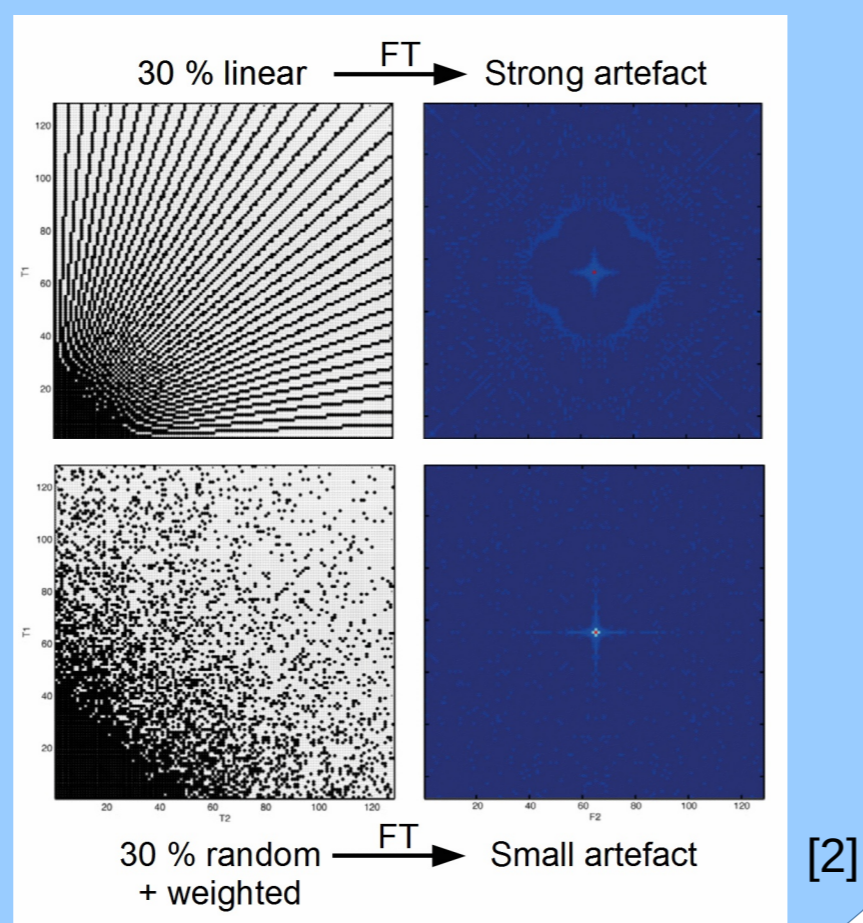
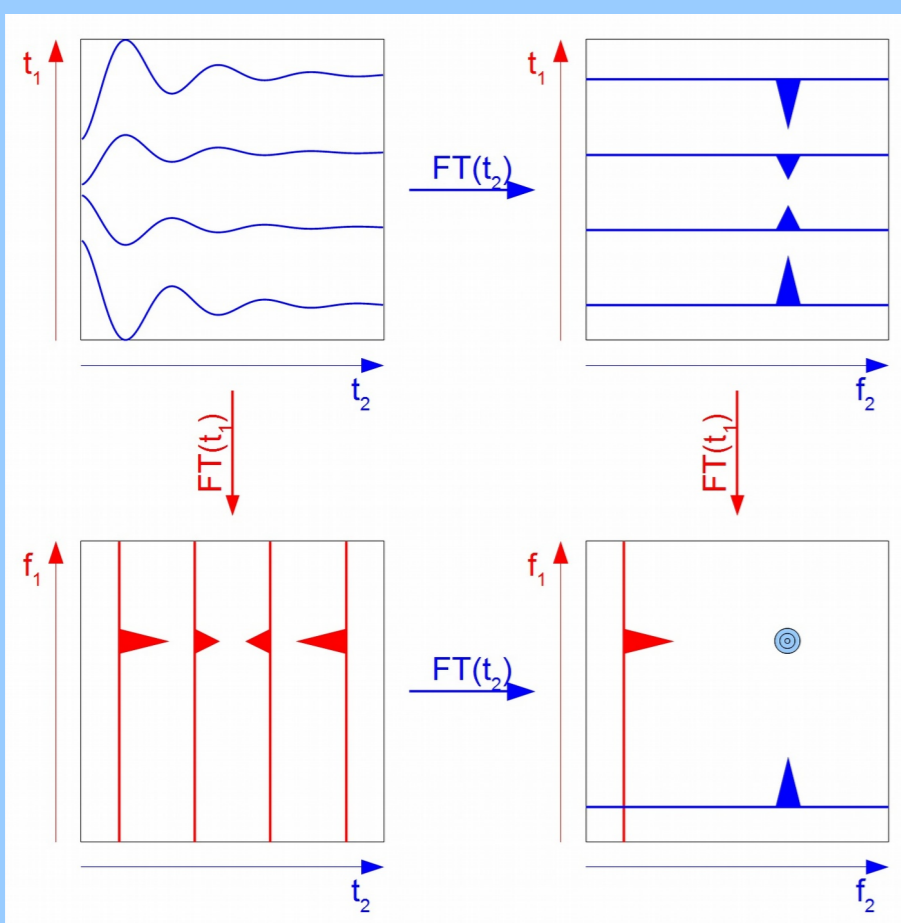
Sensitivity gain = time gain or sample size gain



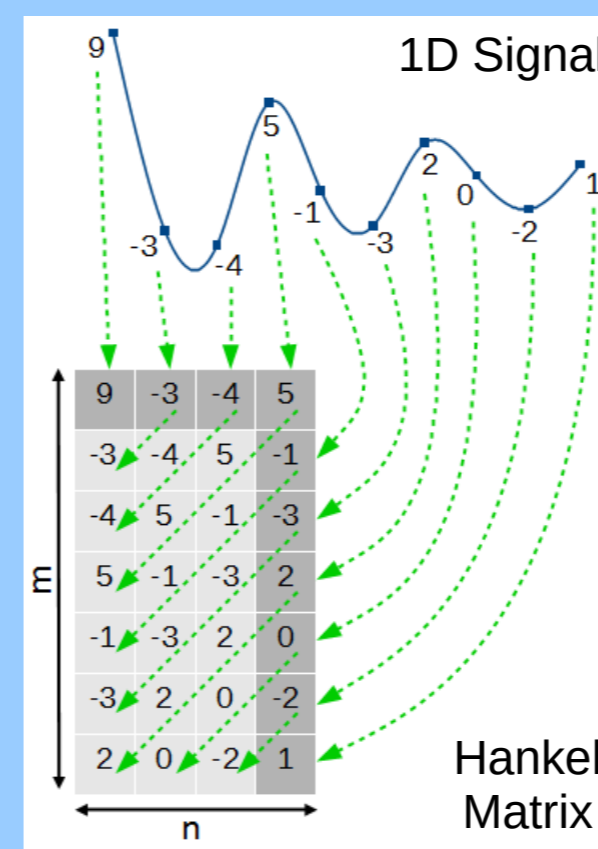
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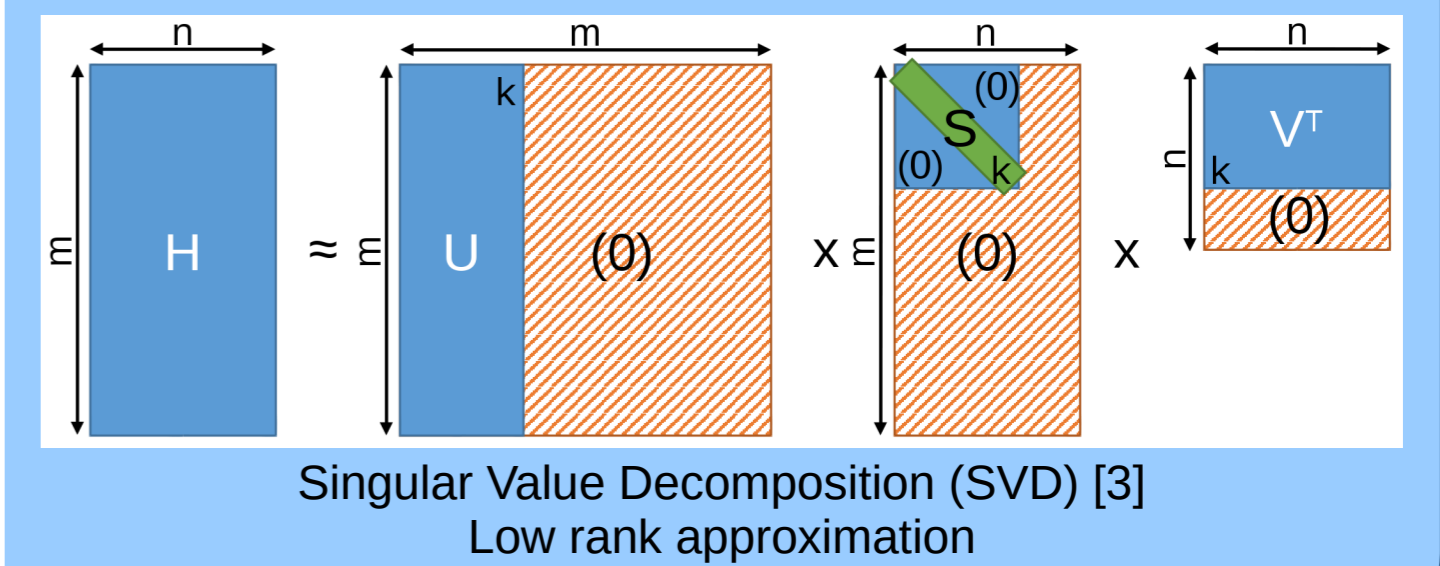
Non-Uniform Sampling (NUS)



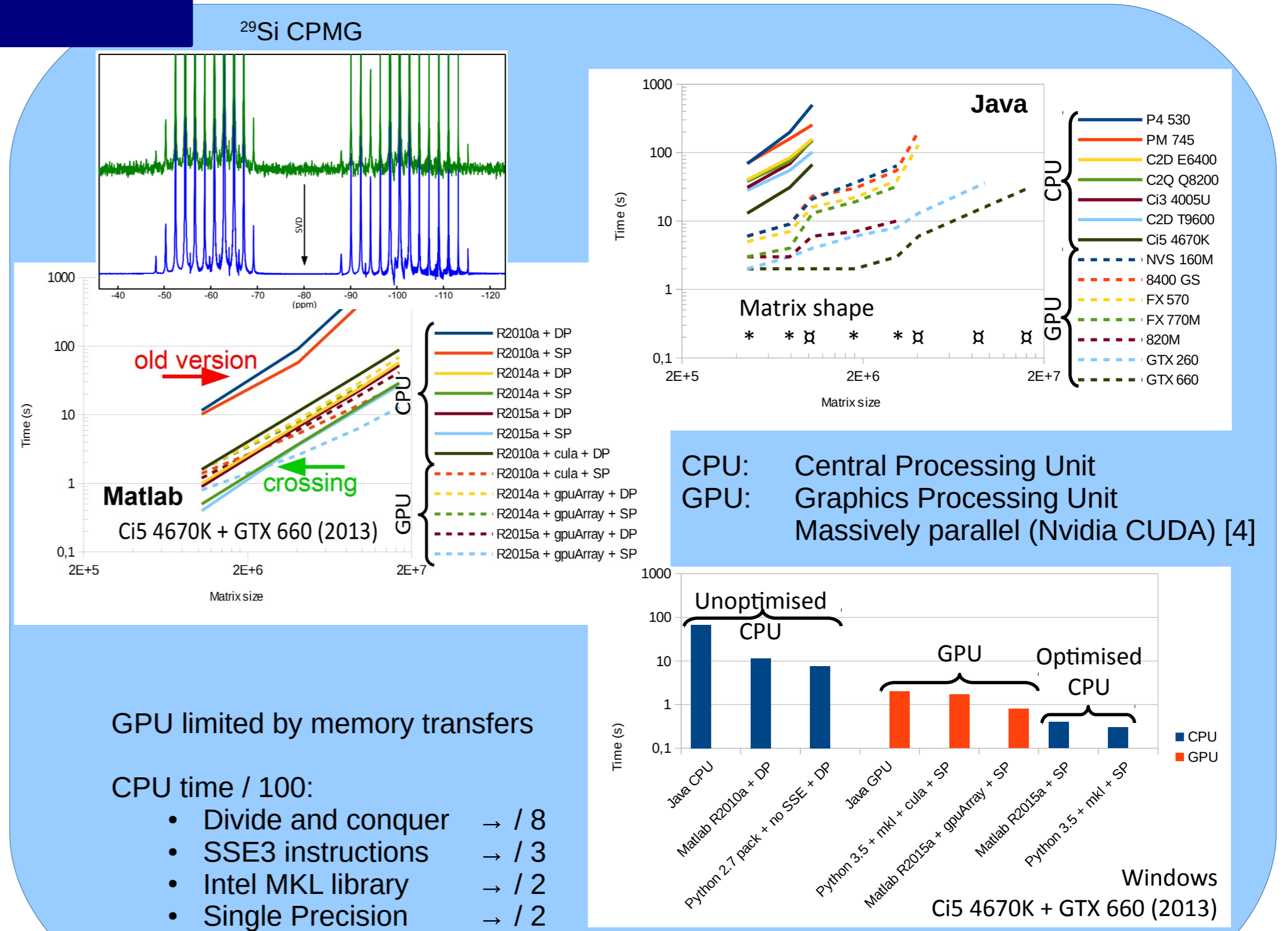
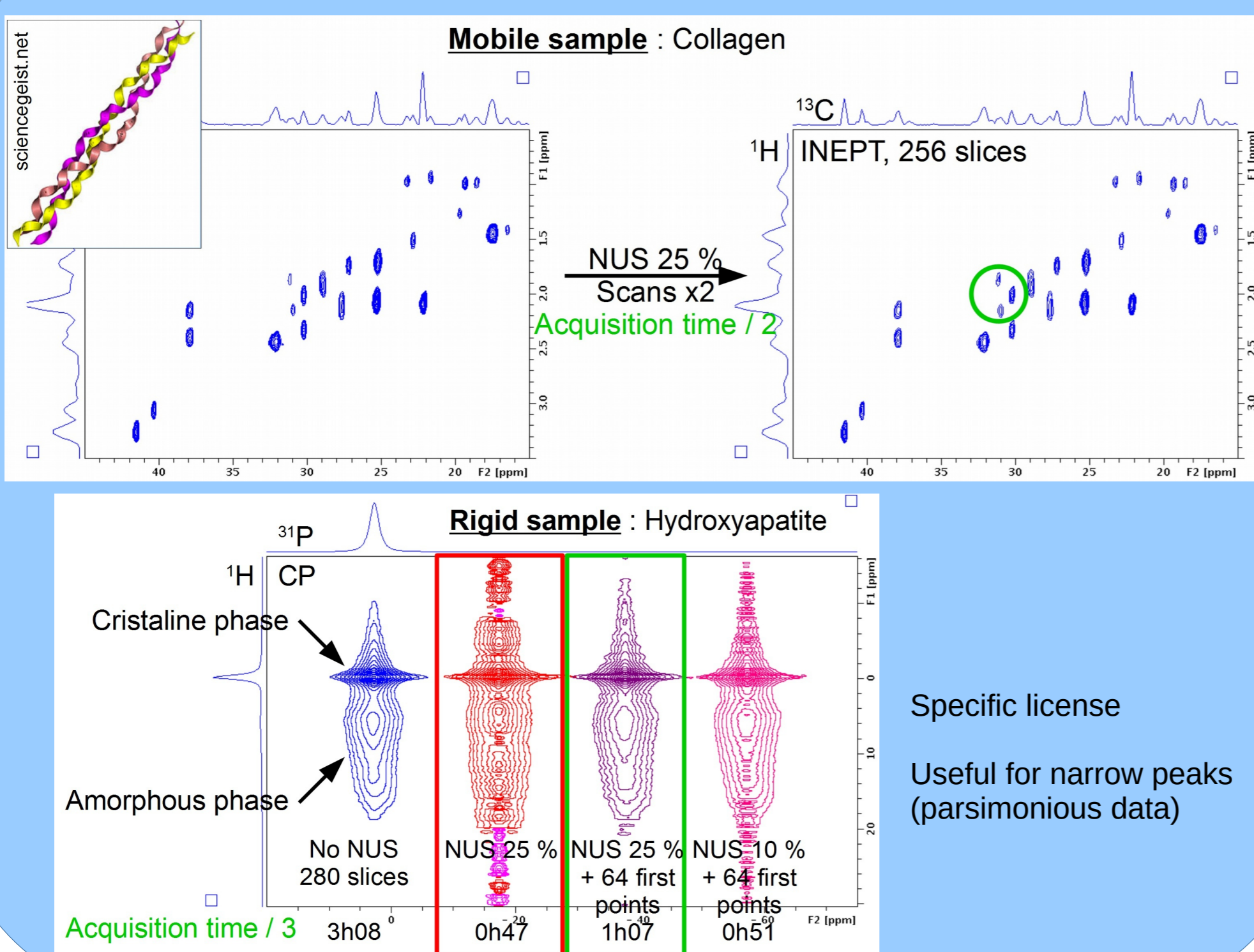
Tools



Spectra denoising



Results



Highlights

- NUS and SVD are useful to increase sensitivity
- Efficient algorithms are critical
- Graphic card is a low cost option (Nvidia GTX 750 = 120 €)

Future work

- Automatic SVD thresholding
- Sparse matrix SVD
- Combining NUS and SVD

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