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Guillaume Laurent, Christian Bonhomme

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Non-Uniform Sampling & Denoising applied to Nuclear Magnetic Resonance



G. LAURENT, C. BONHOMME



Laboratoire de Chimie de la Matière Condensée de Paris



Context

Nuclear Magnetic Resonance



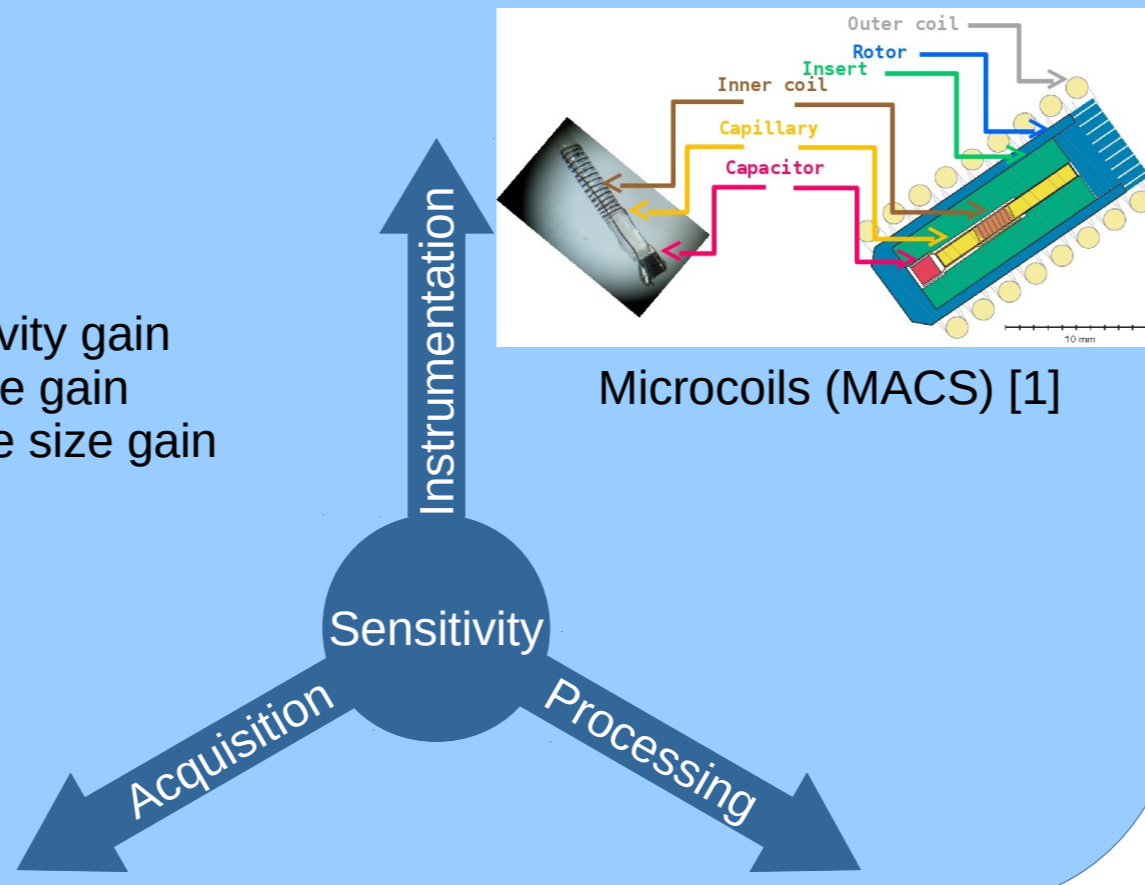
Physico-chemical spectroscopic analysis



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

Increasing sensitivity

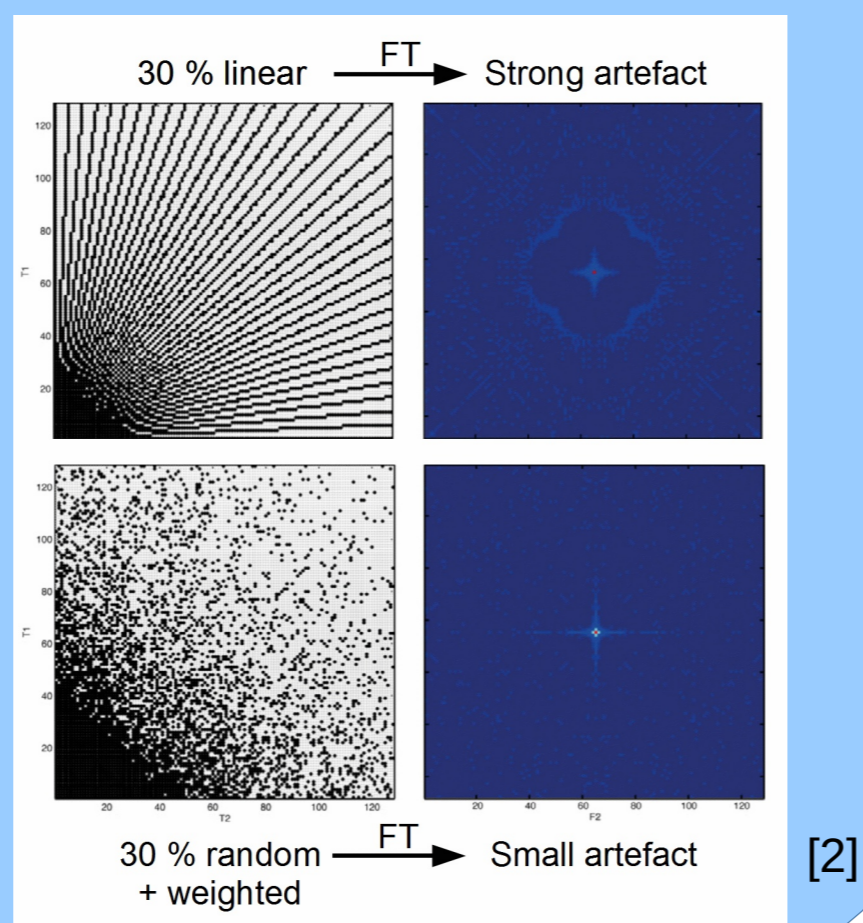
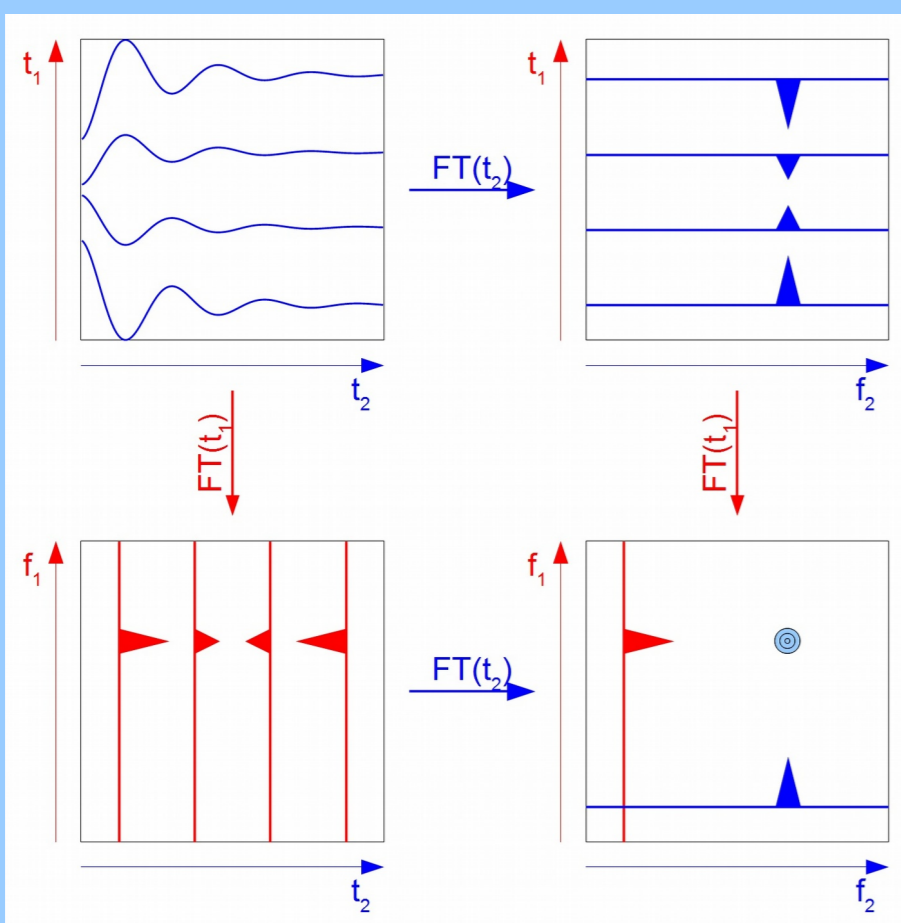
Sensitivity gain = time gain or sample size gain



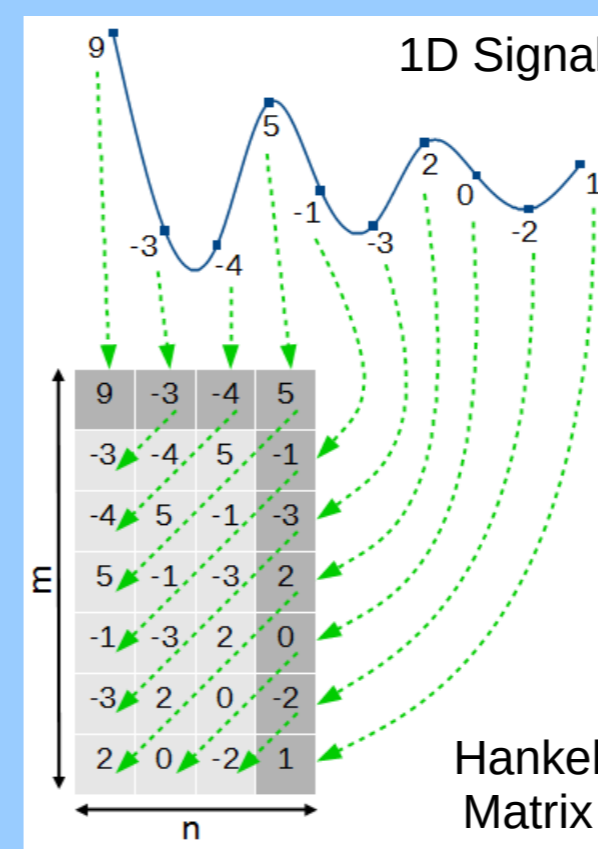
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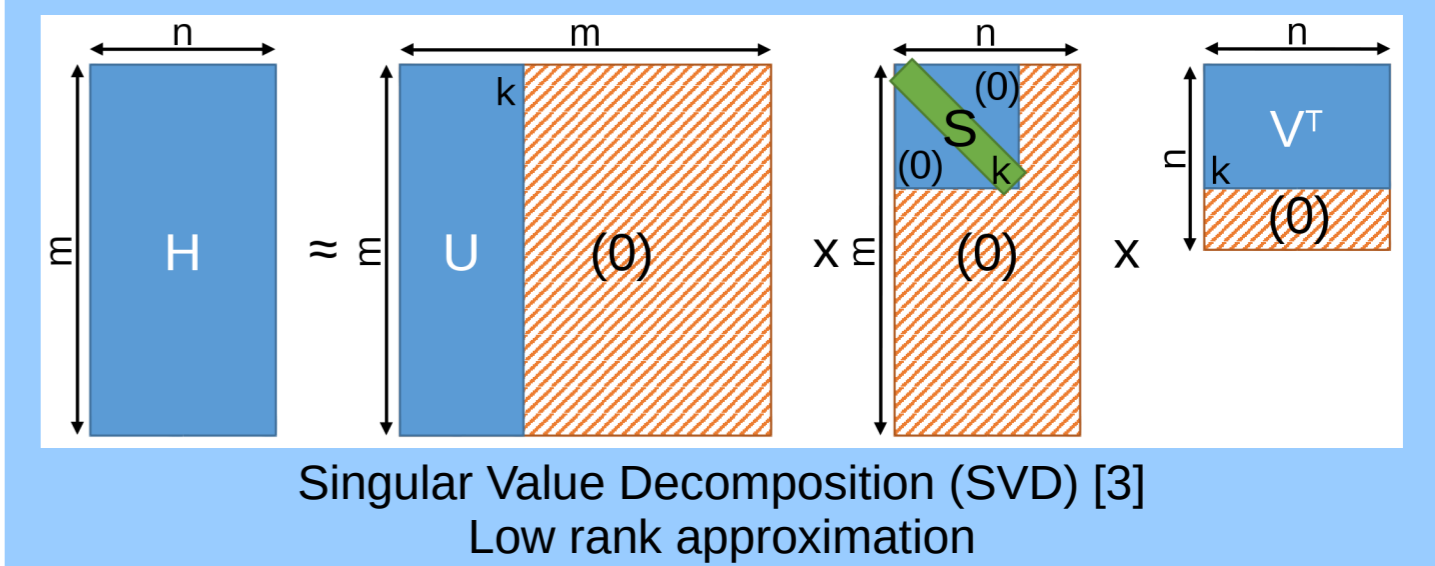
Non-Uniform Sampling (NUS)



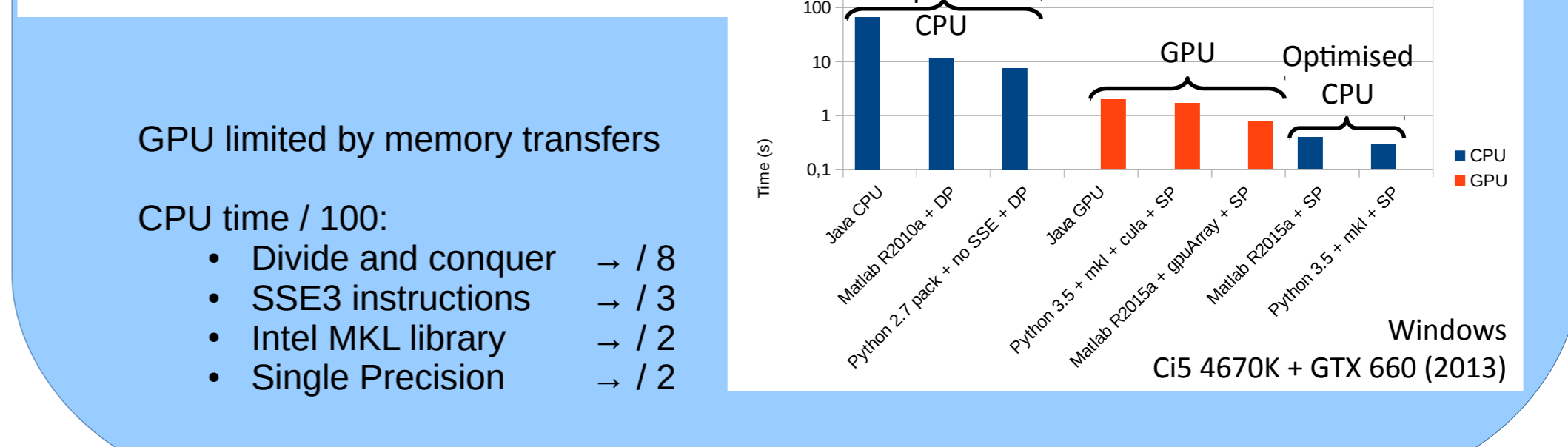
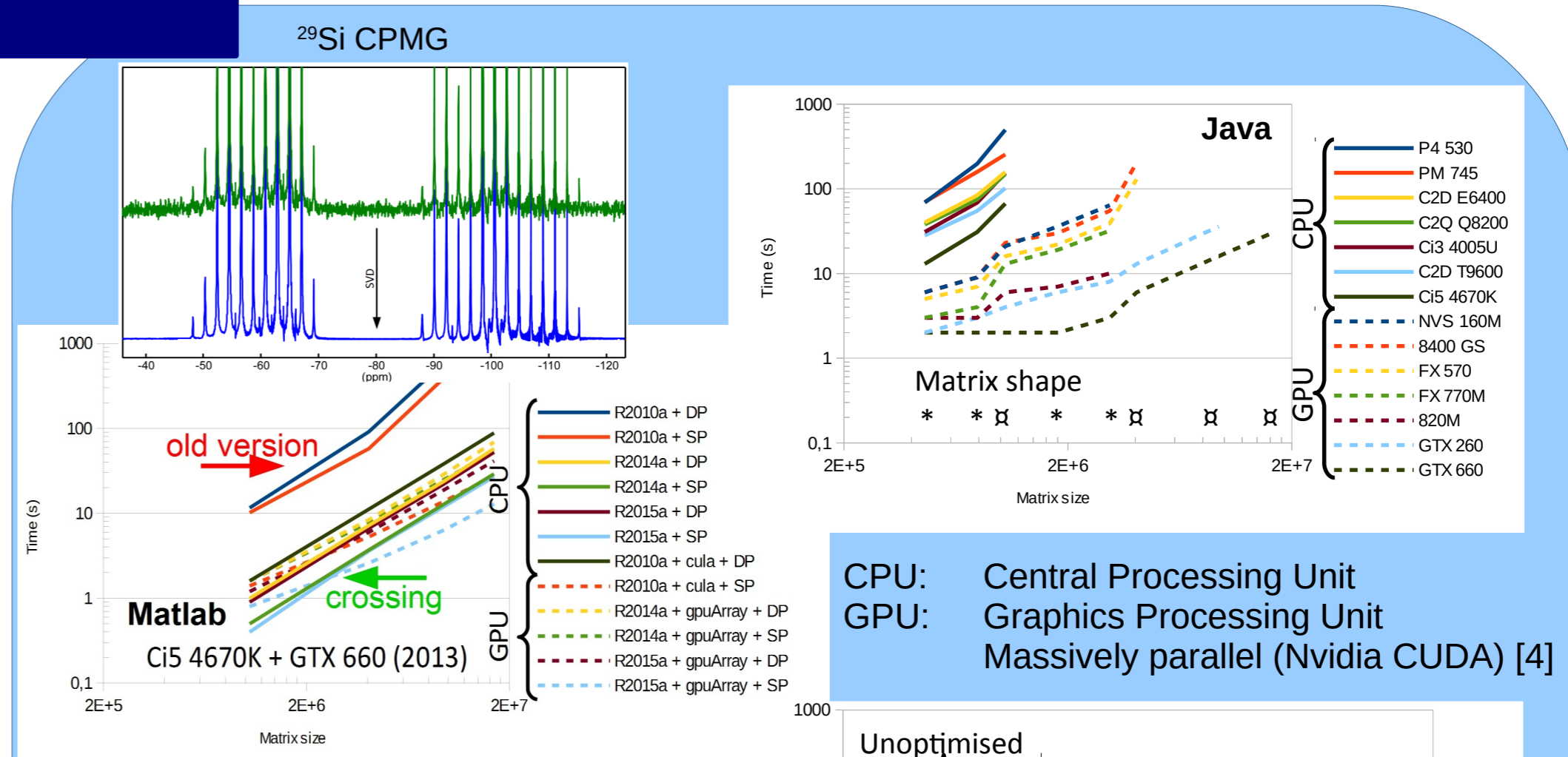
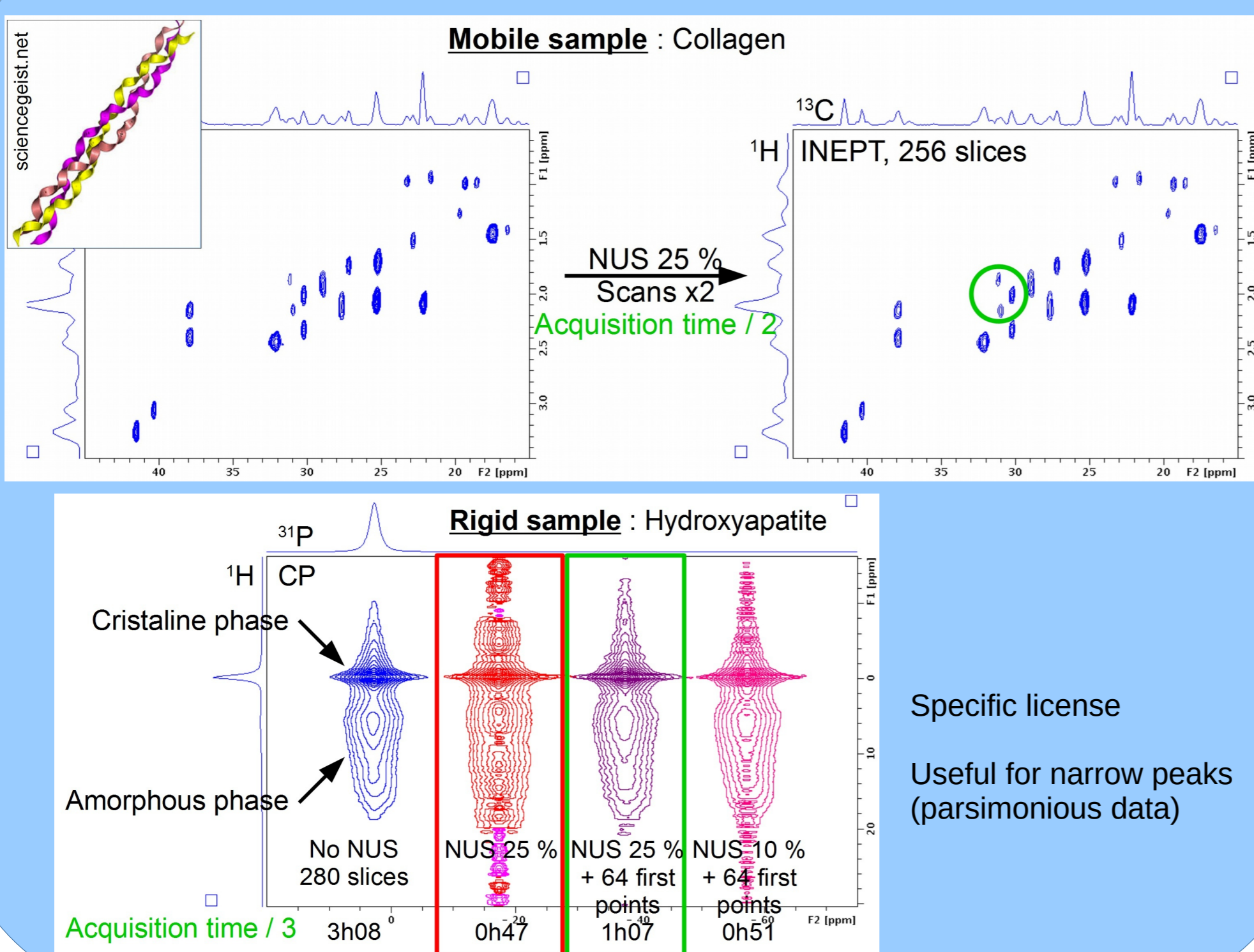
Tools



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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- V. BARRET-VIVIN, F. PORTIER and M. ROBIN for samples
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