



Solid-state nuclear magnetic resonance: from physics to materials

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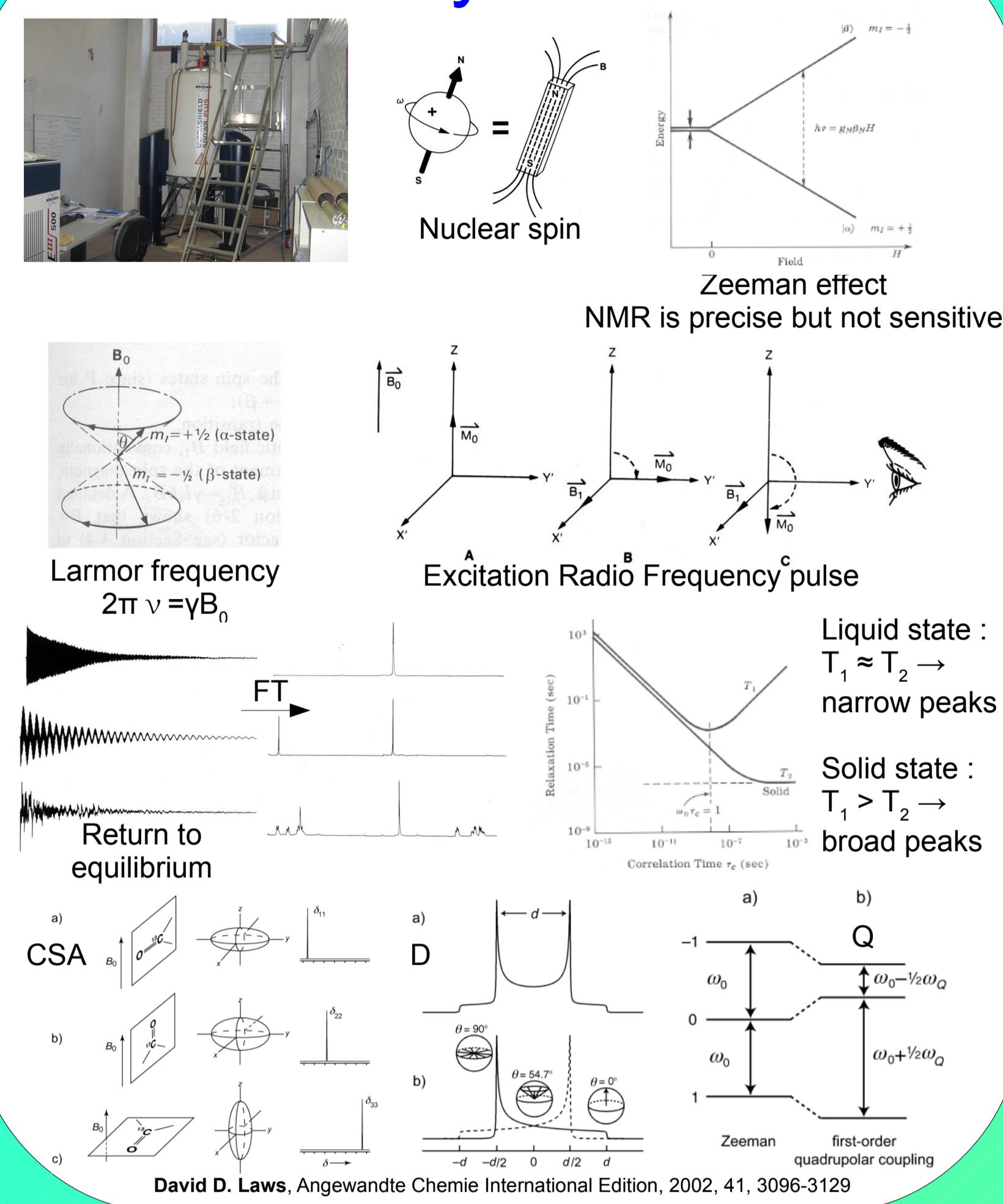
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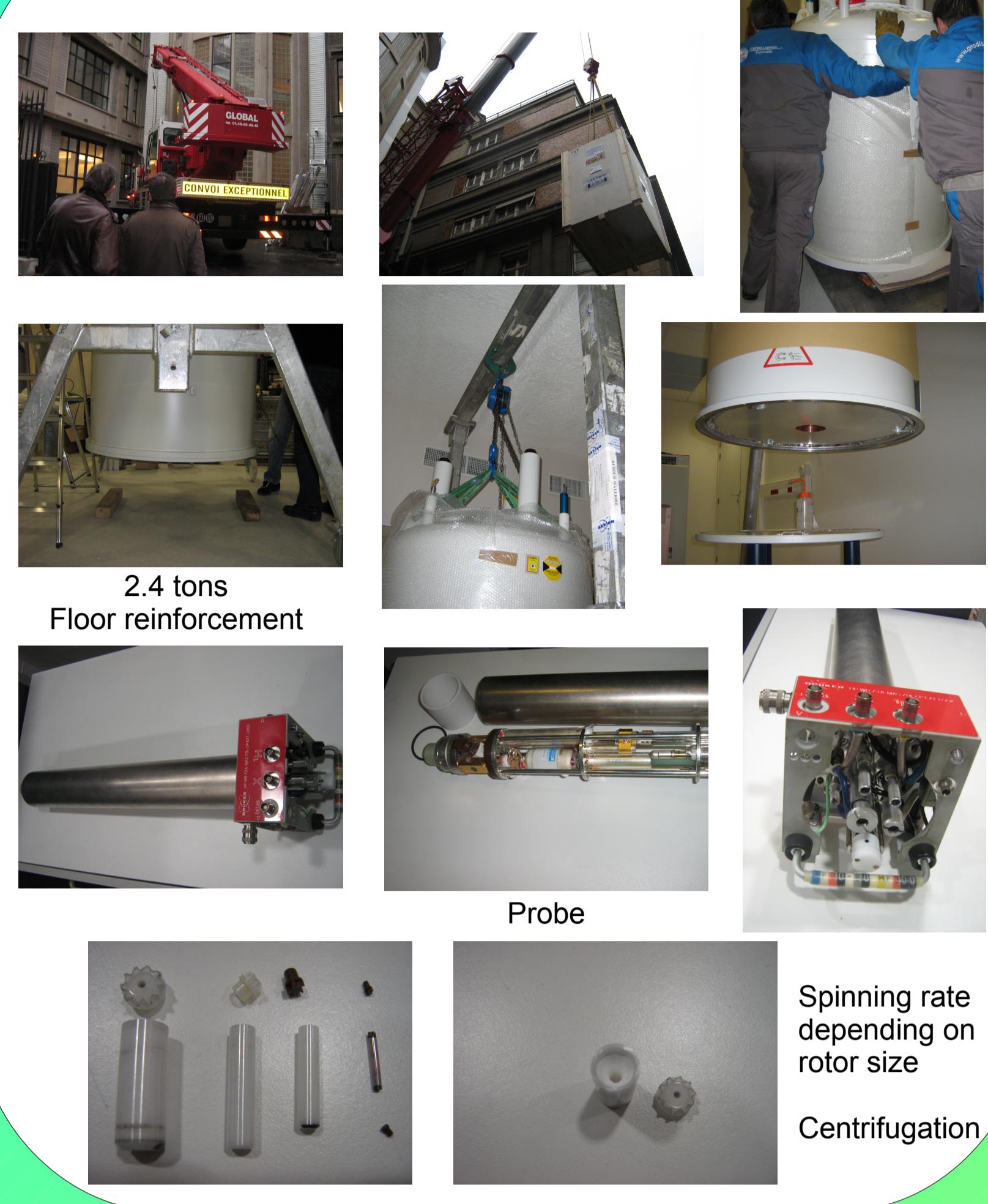
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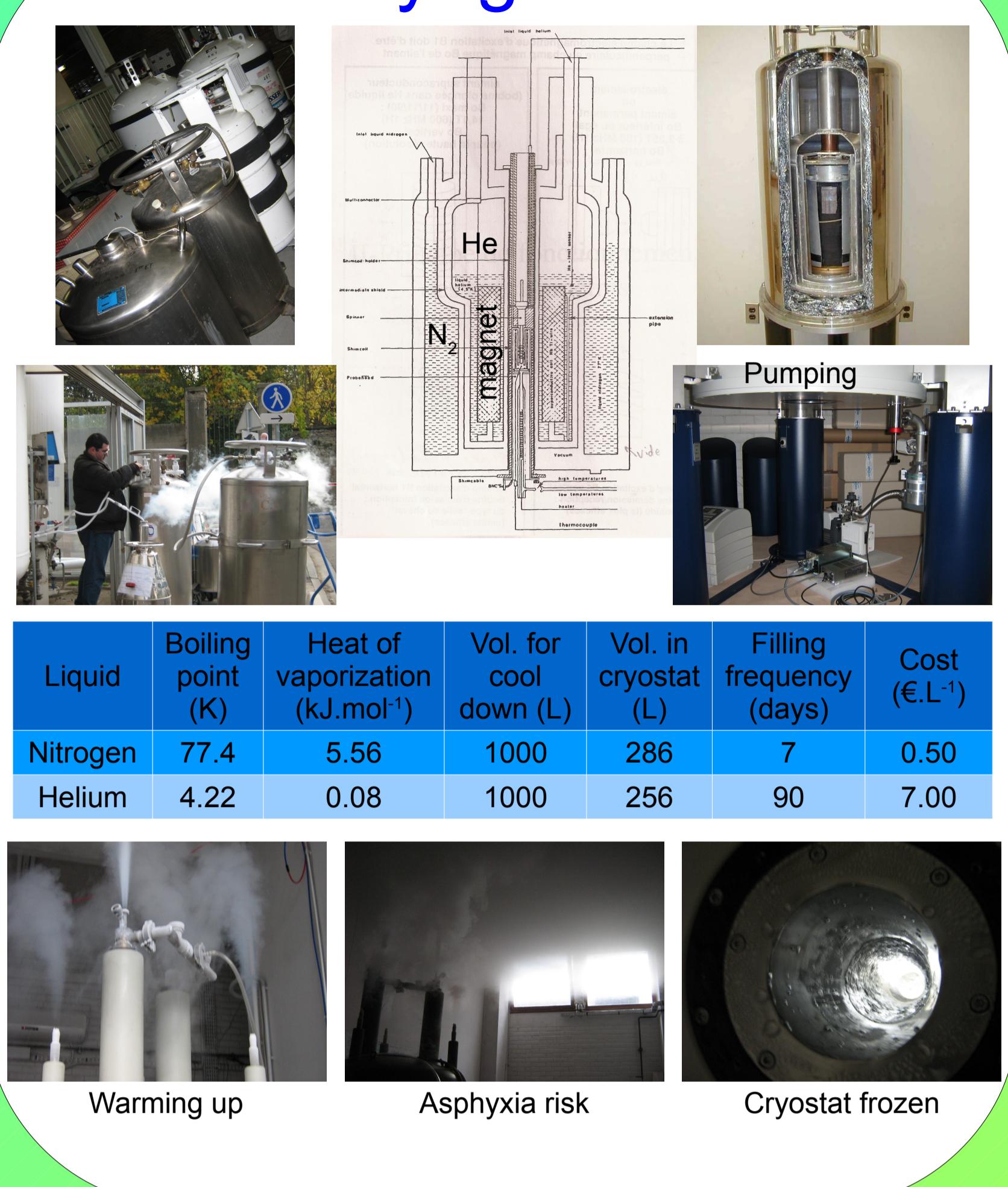
Physics



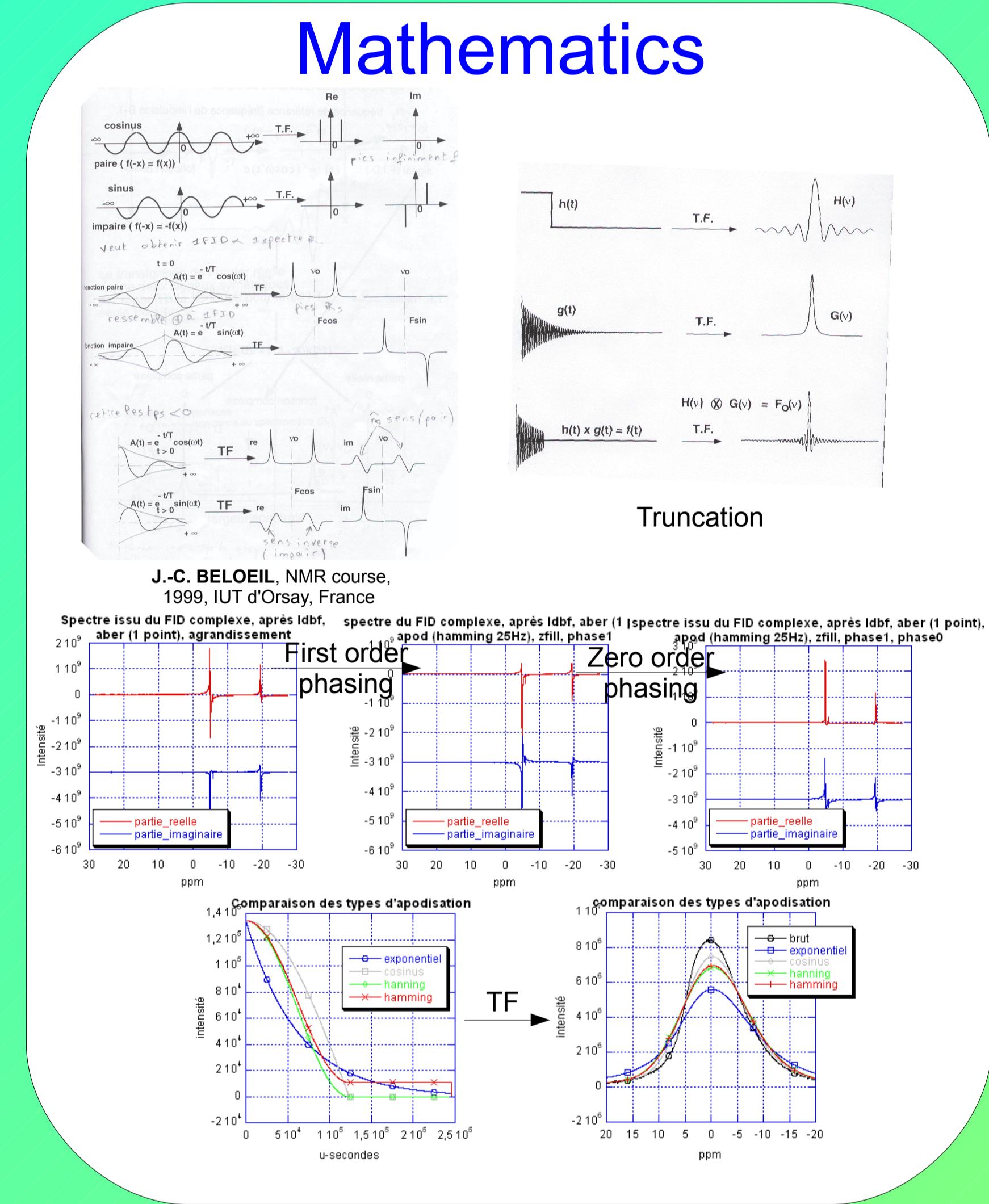
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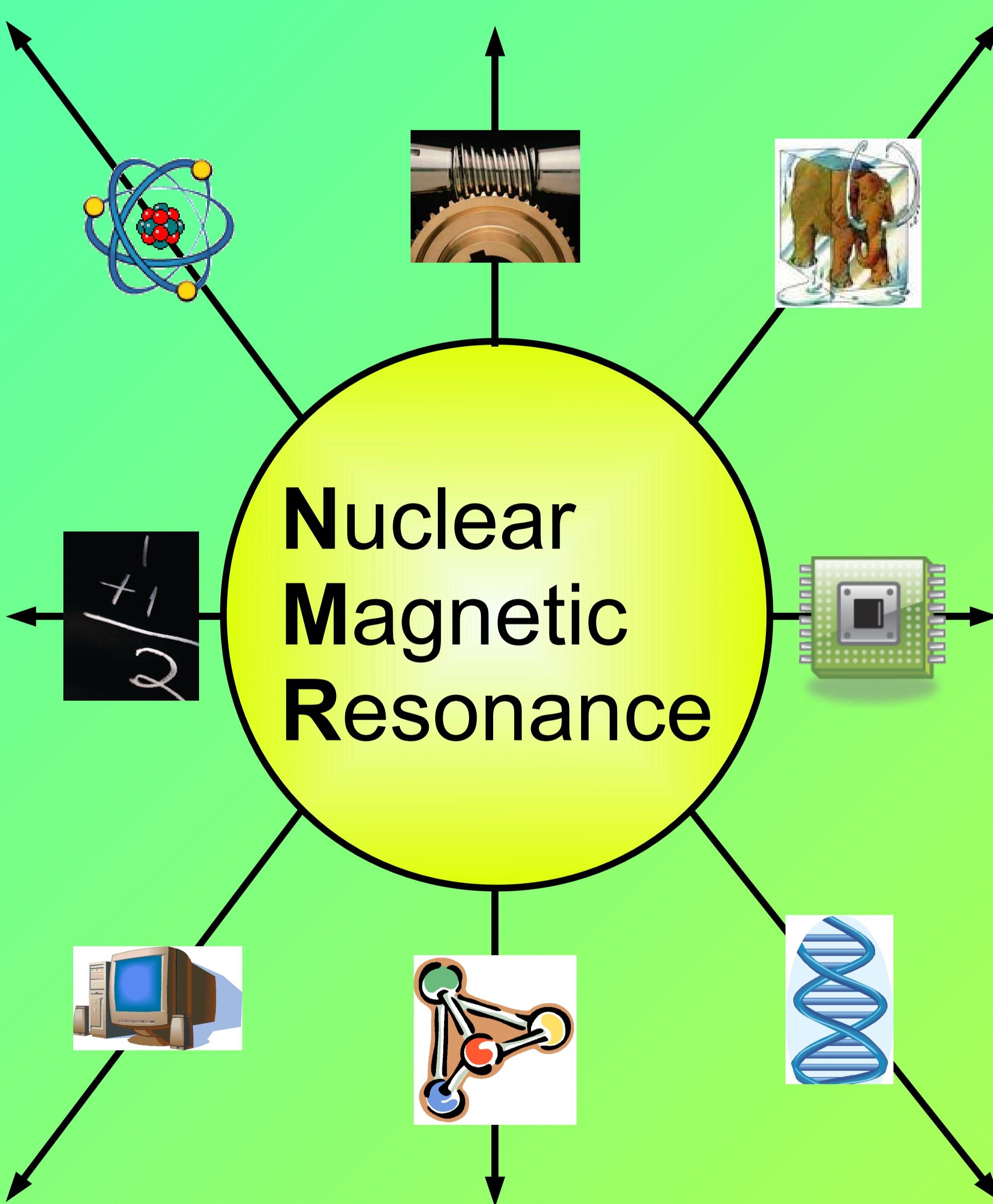
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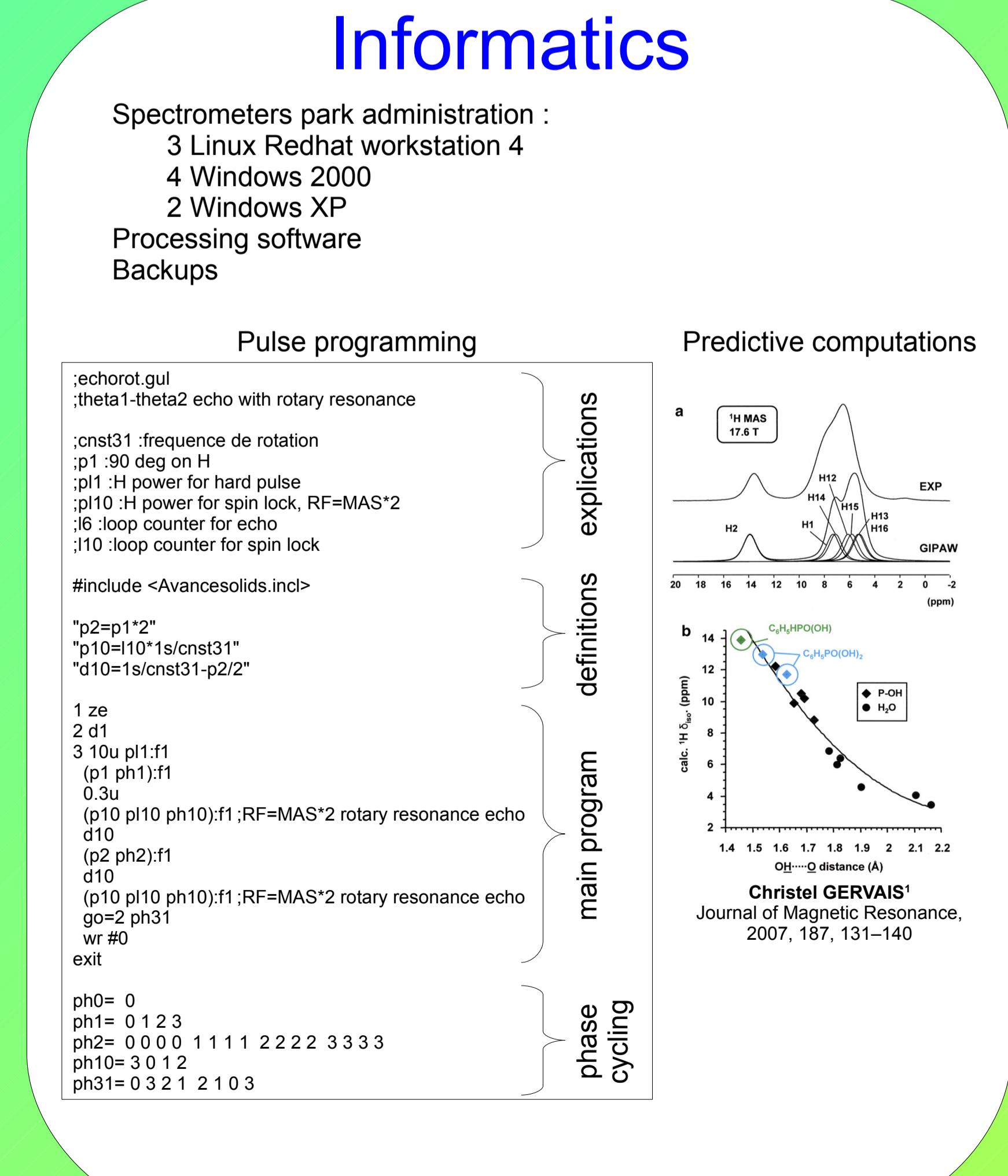
Mathematics



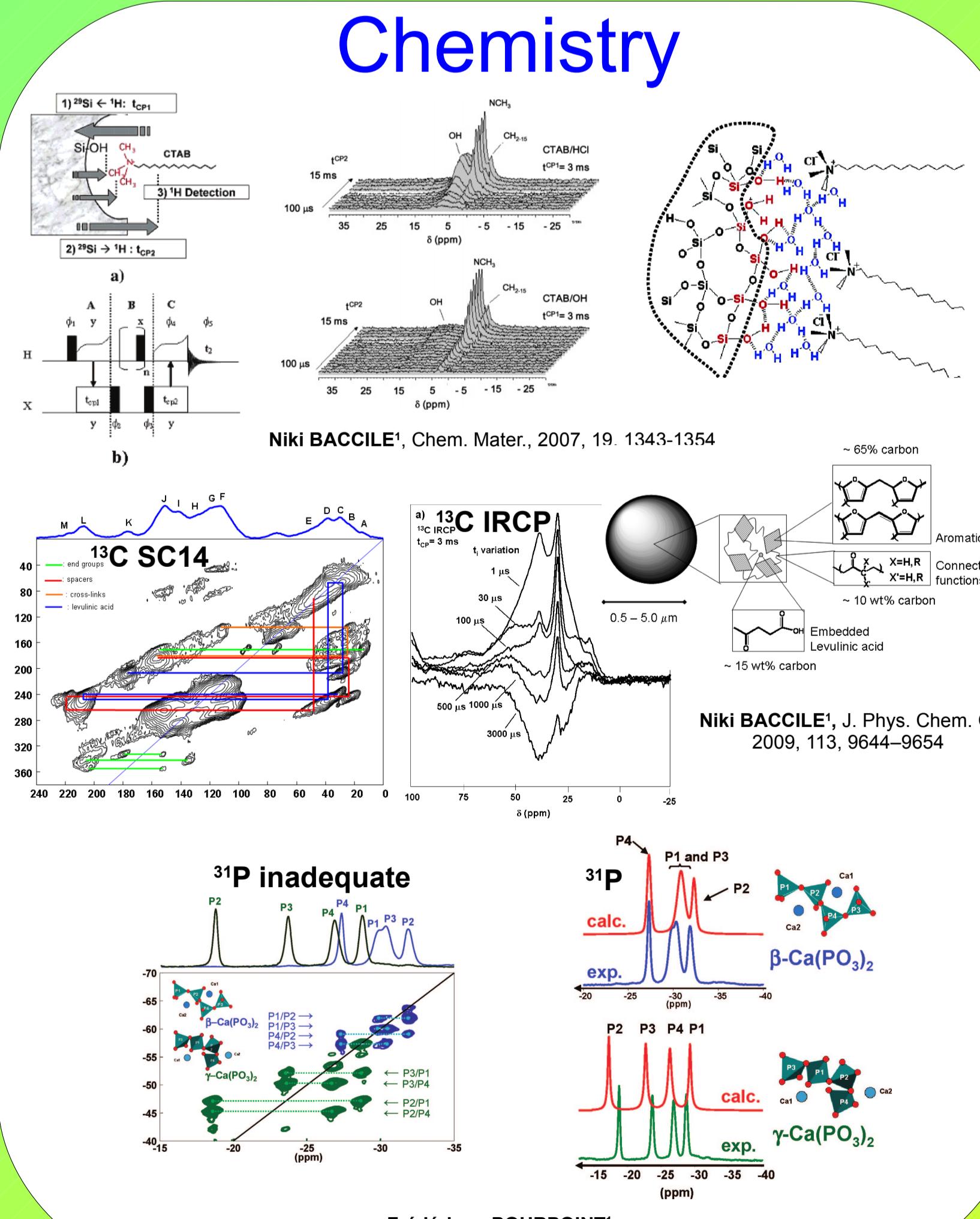
Nuclear Magnetic Resonance



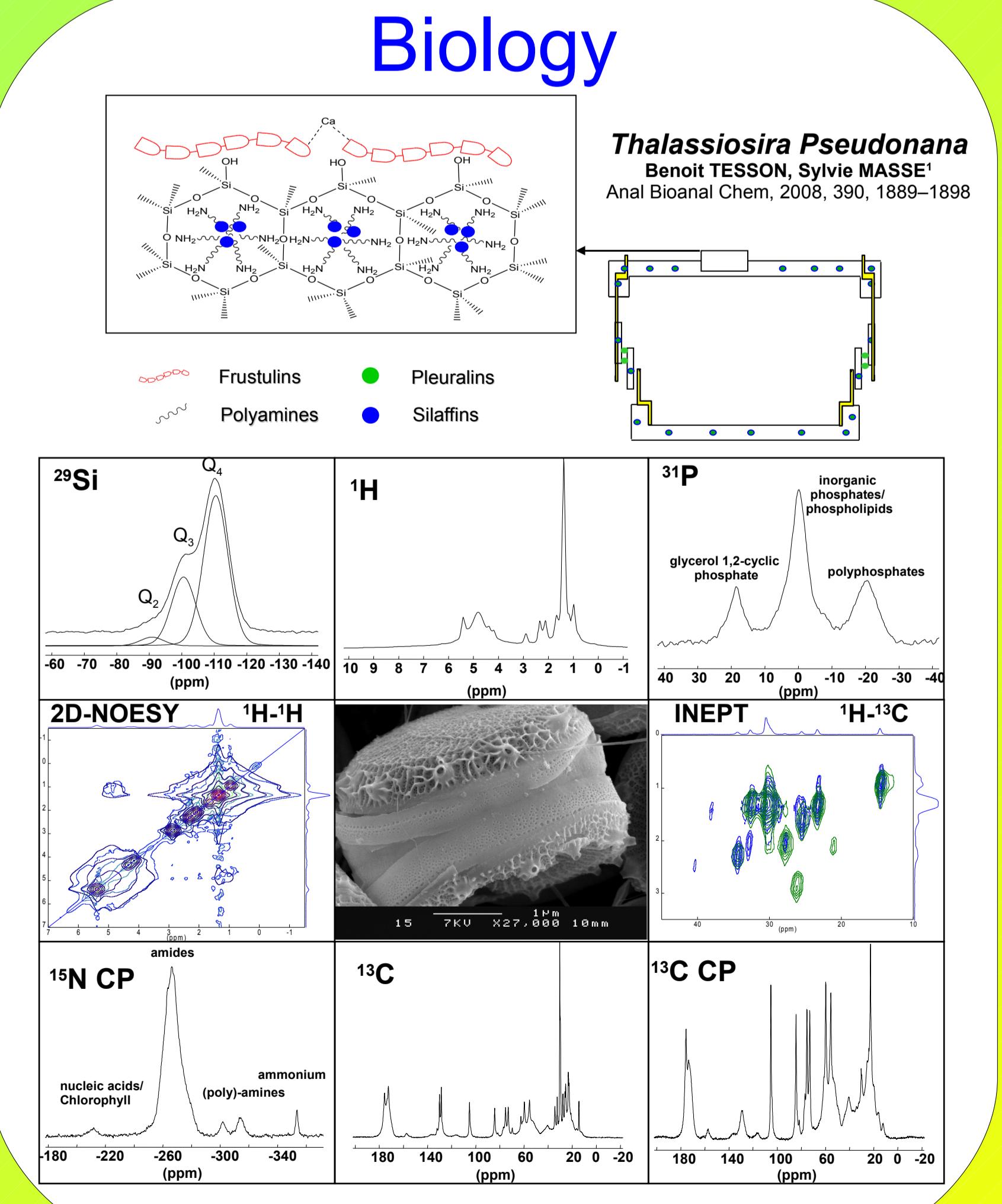
Informatics



Chemistry



Biology



Conclusions

Nuclear Magnetic Resonance is a powerful technique that interacts with many fields, for instance physics, mechanics, cryogenics, electronics, mathematics, informatics, and of course chemistry and biology. In liquid state, NMR is sometimes used as a black box, just to check if synthesis works. However, in solid state it is difficult to use it this way. Indeed, physical interactions are not averaged anymore, leading to signal broadening. Some tools can be used to narrow the signals and / or to manipulate interactions either in the laboratory frame or in the rotating frame. Solid state NMR can be used on a wide range of nucleus to quantify species, study their mobility, check proximities between different parts of the sample, either by dipolar coupling or by chemical bonding. One sometimes need to avoid physical artifacts such as dead time in order to get a correct spectrum. In this case, linear prediction and other mathematic tools can be very useful. Finally, one has also to keep in mind that the sample itself can induce difficulties, especially when studying nanoparticles where the side effects become not negligible at all.