# Developing and applying Ultrafast NMR-Spectroscopy

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Different methodologies have been reported in recent years to speed up the time consuming acquisition of multidimensional NMR spectroscopy.[1] Among them one of the most promising is *UltraFast NMR-Spectroscopy* (UF-NMR), developed by the Lucio Frydman's group. In this respect a significative number of applications for liquid state, solids and MRI have been described.

The application of UF-NMR has to deal with a number of specific aspects which concern to the calculation of acquisition parameters and processing of the experiment. Because of these characteristics UF-NMR can not be actually considered a routine experiment. Regarding the scope of the methodology in the liquid state, it has been applied successfully to sequences based in the scalar coupling such as TOCSY, HSQC or the complementary UltraSOFAST HMQC.

We have started to apply this methodology in order to monitorize processes related with the mechanisms of organic reactions described by us and others. Different programs based on Matlab have been developed by us to carry out different necessary steps to calculate acquisition parameters and to process the obtained results. In this regard we would like to show here the interlazed Fourier transform, which permits to increase the spectral width in factor 2.

We have optimized the experimental conditions to apply scalar coupling based sequences such as COSY, TOCSY and HSQC, HMBC with unlabelled molecules. The methodology is applied to the reaction of 3-pentanone with acetonitrile in the presence of triflic anhydride.

We wish now to present here the first 2D-NMR ultrafast experiment based on the dipolar coupling: Ultrafast-2DNOESY (1scan, 0.25s). A new perspective is offered here since this experiment opens the way to monitorize intra and intermolecular interactions from time zero.

[1] Gal, M.; Schanda, P.; Brutscher, B.; Frydman, L., *J. Am. Chem. Soc.*, 2007, 129, 1372-1377.

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