

- Methodology and instrumentation in Nuclear Quadrupole Resonance (NQR)

This research topic focusses on the development of NQR, a characterization technique close to NMR, where the spin polarization is generated by the interaction of quadrupole nuclei with the surrounding electrical field gradient. Therefore the technique does not necessitate external magnetic fields to generate the spin polarization. Our project aims to explore the complementarity of the NQR, NMR and crystallography techniques. In this context we work on the NQR instrumentation to reduce noise sources and provide sensitivity enhancement. This is an interdisciplinary project where we apply instrumentation developments in electronics to our spectroscopic analysis problematics.

The first aspect regards the optimization of NQR probeheads in order to optimize temperature control and sample cooling to allow low temperature NQR characterization of metastable photoinduced states. The second aspect concerns the development of a portable miniaturized NQR spectrometer based on FPGA technology (N. Kachkachi).

The aim of the project is to show the potential of the technique for industrial applications by developing a low cost portable system for the identification of counterfeit medicine.

