

WEBINAR SERIES ON NMR RELAXOMETRY THEORY AND APPLICATIONS



THURSDAY 11TH JUNE 2020, 16.00-17.00 CEST

**Prof. GIACOMO PARIGI, CERM, University of Florence,
Italy**

will present a webinar entitled

“NMR relaxometry of paramagnetic nanoparticles”

Abstract

NMR relaxometry of paramagnetic nanoparticles

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The NMRD profiles of paramagnetic systems contain valuable information of their structure and dynamics. However, their analysis is not trivial due to the high number of parameters from which they depend and to the theoretical treatment which is needed. Simplified models are usually applied, based on the equations developed by Solomon, Bloembergen and Morgan (SBM model), the validity of which is however limited to fast rotating systems where the zero field splitting (ZFS) can be neglected. NMRD profiles can easily allow for monitoring the occurrence of interactions between paramagnetic, e.g. gadolinium(III) containing, complexes and macromolecules. The detection of adducts formed between functionalized gadolinium(III) complexes and specific macromolecules represents a unique biomarker for the presence of these nanoparticles in biological systems. We have also analyzed the relaxation profiles of gadolinium complexes (Gd-HP-DO3A) in crosslinked hyaluronic acid. Hyaluronic acid is a natural component of skin and many connective tissues, an important component of the extracellular matrix, and it may represent a good model for monitoring the relaxation properties of MRI contrast agents in tissues. The NMRD profiles indicate a modest interaction of the contrast agent with the hydrogel, which reduces the mobility of the water molecules outside the first-coordination sphere of the gadolinium(III) ion.

Author Biography

Giacomo Parigi graduated in Physics cum laude at the University of Florence (1992) and received his PhD in Chemistry at the University of Florence. He was postdoctor at the Department of Chemistry, Researcher (1999-2006) and Associate Professor of Chemistry (2006-) at the Magnetic Resonance Center (CERM) and the Department of Chemistry of the University of Florence. His research interests are mainly oriented to the study of NMR effects related to paramagnetism for the structural and dynamic characterization of biomolecules, to the analysis of the relaxometric profiles of paramagnetic systems and biomolecules, and to nuclear and electron relaxation. He is co-author with I. Bertini and C. Luchinat of the book "Solution NMR of Paramagnetic Molecules" (Elsevier, 2001), and with I. Bertini, C. Luchinat and E. Ravera of the book "NMR of Paramagnetic Molecules" (Elsevier, 2017), and coeditor with I. Bertini and K.S. McGreevy of the book "NMR of Biomolecules: Towards Mechanistic Systems Biology" (Wiley-VCH, 2012) and with C. Luchinat and E. Ravera of the book "Paramagnetism in Experimental Biomolecular NMR" (RSC, 2018). He is co-author of more than 130 papers published in international journals.