

## iNEXT workshop on Integrated methodologies and approaches for structural biology

Name of Speaker: **Guido Pintacuda**

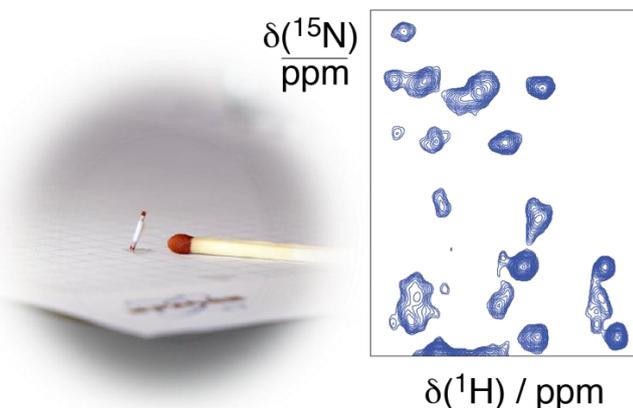
University / Research Institute / Department: **High Field NMR Center of Lyon (CNRS/ENS Lyon/UCBL)**

Title of Lecture: **Fast magic-angle spinning NMR of membrane proteins**

### Abstract:

Building on a decade of continuous advances of the community, the recent development of very fast (60 kHz and above) magic-angle spinning (MAS) probes has revolutionised the field of solid-state NMR. Today, rapid “fingerprinting” of proteins by  $^1\text{H}$  detection is possible with a ten-fold reduction of the required sample amounts with respect to conventional approaches, not only in deuterated molecules but also in fully-protonated substrates. Extensive and robust resonance assignments can be derived rapidly for small-to-medium sized proteins (up to ca. 300 residues), opening the way to the determination of inter-nuclear proximities, relative orientations of secondary structural elements, protein-cofactor interactions, local and global dynamics.

Fast MAS and  $^1\text{H}$  detection techniques have nowadays been shown to be applicable to membrane-bound systems. This talk reviews the strategies underlying this recent leap forward in sensitivity and resolution, describing its potential for the detailed characterization of membrane proteins in lipid bilayers.



## Research Profile:

**Dr. Guido Pintacuda** studied Chemistry at the Scuola Normale Superiore in Pisa, where he graduated in 1997, and then completed his PhD in 2002. After working in Stockholm and Canberra, he moved to Lyon, where he is a CNRS Research Director (Full Professor) and head of the High-Field NMR center. His current research concerns the development of new solid-state NMR methods for complex molecular systems in chemistry and biology, mostly with the help of fast magic-angle spinning. He is Principal Investigator in several projects funded by national and European agencies, has coordinated an Initial Training Network, and in 2015 he was awarded an ERC consolidator grant on “Structure of paramagnetic integral membrane metalloproteins by MAS-NMR”.

## Three selected publications:

1. L. B. Andreas, K. Jaudzems, J. Stanek, D. Lalli, A. Bertarello, T. Le Marchand, D. Cala-De Paepe, S. Kotelovica, I. Akopjana, B. Knott, S. Wegner, F. Engelke, A. Lesage, L. Emsley, K. Tars, T. Herrmann, and **G. Pintacuda** (2016) “Structure of fully protonated proteins by proton-detected magic-angle spinning NMR”, *Proc. Natl. Acad. Sci. USA*, 113, 9187-9192.
2. D. Lalli, M. Idso, L. B. Andreas, S. Hussain, N. Baxter, S. Han, B. F. Chmelka and **G. Pintacuda** “Proton-based structural analysis of a heptahelical transmembrane protein in lipid bilayers”, *J. Am. Chem. Soc.* 2017, 139, 13006-13012.
3. T. Schubeis, T. Le Marchand, L. B. Andreas and **G. Pintacuda** “<sup>1</sup>H NMR in solids evolves as a powerful new tool for membrane proteins”, *J. Magn. Reson.* 2018, 287, 140-152.