

VERY HIGH FIELD NMR CENTER OF LYON – CRMN



BREAKTHROUGH DEVELOPMENTS IN METHODOLOGY AND INSTRUMENTATION FOR MAGNETIC RESONANCE

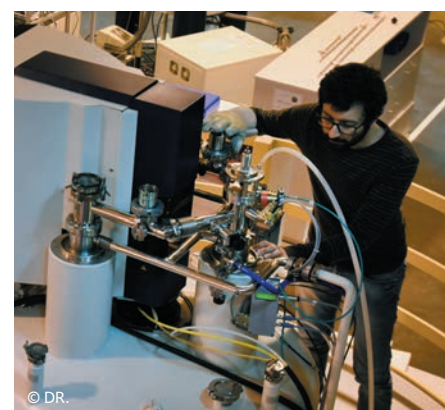
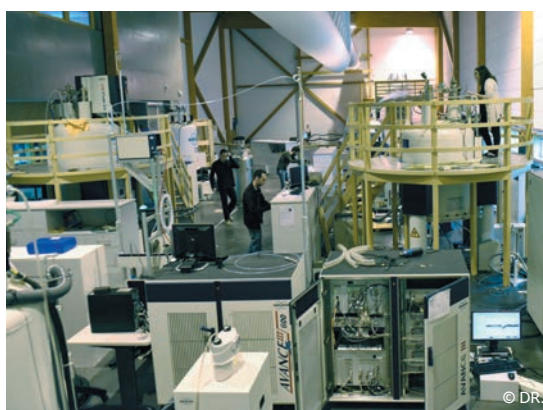
<https://www.crmn-lyon.fr>

RESEARCH TOPICS

- SOLID-STATE NMR WITH MAGIC-ANGLE SPINNING
- MOLECULAR DYNAMICS BY NMR IN SOLUTION
- METHODS AND INSTRUMENTATION FOR HYPERPOLARIZED NMR
- PARAMAGNETIC NMR

CROSS-CUTTING THEMES

- STRUCTURE AND DYNAMICS OF PROTEINS AND RNAS
- FUNCTIONAL MATERIALS
- MECHANISMS OF CHEMICAL REACTIONS
- COMPLEX MIXTURES IN CHEMISTRY AND HEALTH
- DRUG AND VACCINE DESIGN



RESEARCH EQUIPMENT AND TOOLS

- Platform of 7 NMR spectrometers from 400 MHz (9.4 T) to 1000 MHz (23.5 T)
- Cryoprobes for NMR in solution
- Probes for ultra-fast spinning solid-state NMR
- Gyrotrons and polarizers for solid-state and solution hyperpolarized NMR
- Samplers for serial NMR analysis
- Benchtop spectrometer for RPE at X-Band
- Laboratories for the production and purification of labeled proteins and nucleic acids
- Laboratories for sample preparation and conditioning for chemistry and metabolomics
- Prototyping workshop

KEY FIGURES

32

staff members including **4** researchers, **3** teacher-researchers, **15** PhD students and post-doctoral fellows and **10** research support staff

Over the last 5 years:

156

publications

13

prizes and distinctions including the Raymond and Beverly Sackler Prize in Physical Sciences, the award "Les Etoiles de l'Europe", the Jaffé prize, the Berthelot medal of the French Academy of sciences, the CNRS collective crystal medal and **1** IUF

28

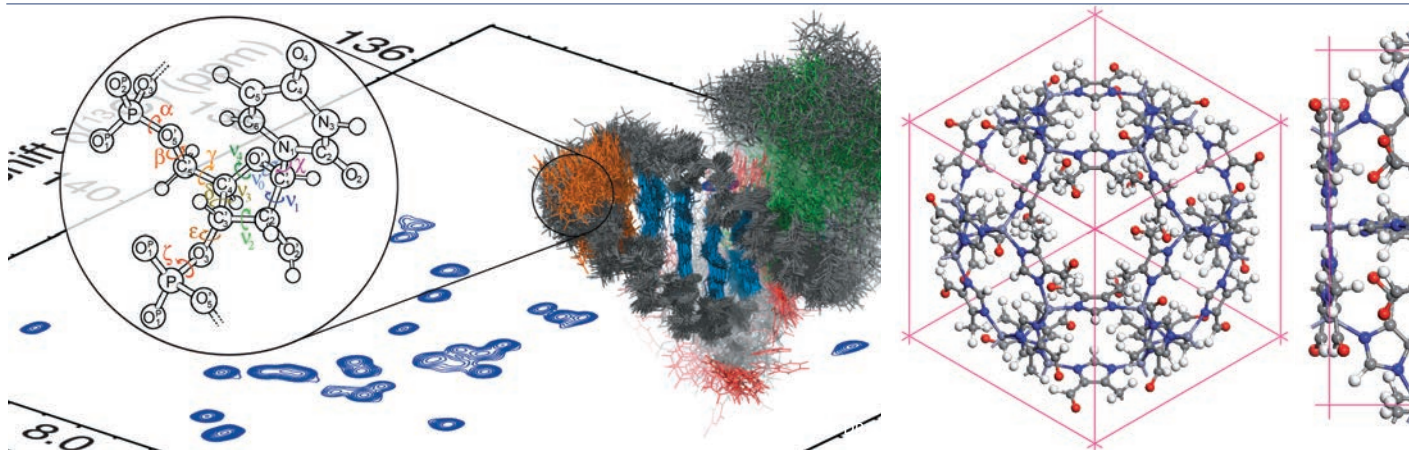
public grants including **3** ERC, **5** Horizon 2020, **4** ANR, **1** EquipEx

15

contracts with private companies: **9** research contracts, **3** active patent families

TRL scale between **1** and **4**

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FROM THE LABORATORY TO THE SOCIO-ECONOMIC WORLD

- International academic collaborations (MIT, UCSB, ETH, EPFL, Cambridge).
- Platform open to the national (IR-NMR-THC) and European (iNext Discovery, PANACEA) scientific communities.
- Collaborations and services with large companies and SMEs (pharmaceuticals, chemicals, energy, instrumentation).
- Privileged access to companies in chemistry, materials science, biology and health via the IRICE platform, co-financed by the Auvergne-Rhône-Alpes Region.
www.crmn-lyon.fr/irice

FOCUS ON

Institutional partnership research

Collaboration with IFPEN within the framework of CARMEN, a joint research laboratory on the characterization of materials of the energy transition. (www.lcr-carmen.fr)

- **Objective:** to strengthen knowledge on molecular and/or colloidal transport in porous substrates and develop fine analysis methodologies for the energy transition.
- **Industrial application:** to develop new catalytic media for biomass conversion, adsorbents for contaminant reduction or renewable energy storage.
- **Experimental techniques:** high-field high-resolution NMR, 3D and environmental microscopy, 3D X-ray imaging, electrochemistry, etc.

Private partnership research

Research collaboration with TotalEnergies

- **Objective:** to develop applications of hyperpolarized NMR in the energy industry, for the characterization of additives that are poorly concentrated in complex matrices (fuels, lubricants, biomass).
- **Scientific knowledge generated:** long-term partnership concretized by a one-year work/study training program between TotalEnergies and the CRMN, future collaborations, publications and patent applications.

Service provided for SANOFI Pasteur

- **Objective:** to understand at the atomic scale the structure of complex pharmaceutical formulations (e.g., vaccines) by investigating the interaction between aluminum-based adjuvants and antigenic proteins.
- **Role of the laboratory:** to probe structure and interfaces of vaccine formulations using high-field hyperpolarized NMR methodologies.

CONTACT

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