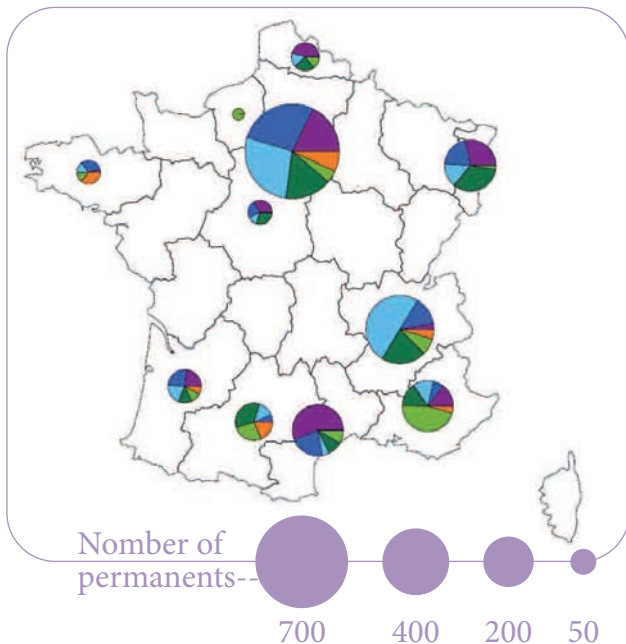


At the heart of biological macromolecules

The Institute of molecular and structural basis of life sciences (ITMO BMSV) carries out research on the mechanisms underlying, the dynamics of, the interactions and interconversion between, biological systems, from molecular to the cellular level, and investigates the complex network of cell regulation.



Scientific topics

- ▶ Molecules and chemistry of, and for, living organisms
- ▶ Sub-cellular processes and biological macromolecules:
 - ▶ Mechanisms and biophysical approaches
 - ▶ (Integrative) Structural biology
- ▶ Control and modelling of living systems:
 - ▶ Regulatory mechanisms, interactions between biomolecules (repair, transcription, translation, transport...)
 - ▶ High-throughput approaches (mass spectrometry, proteomics, genomics, interaction networks) and metabolism-metabolomics
- ▶ Synthetic biology, biological and biomimetic engineering

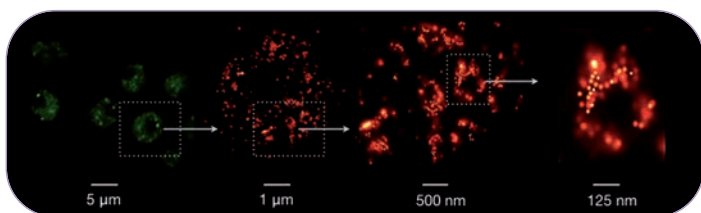
Scientific challenges

- ▶ Increasing our knowledge on molecular and structural bases of life through multidisciplinary approaches

Knowing in details, structures, dynamics, interactions, assemblies, and molecular transformations is essential for a comprehensive understanding the **functioning of organisms**.

The structural and functional characterization of molecules (isolated or associated in complexes), along with the modeling of biological phenomena, requires multidisciplinary research which involves biology, physics, chemistry, bioinformatics and mathematics.

The study of biological molecules in their subcellular context requires the development of **new structural and analytical methods or imaging techniques** with enhanced resolution in space and time.



Confocal and STORM imaging of drosophila cell's nuclear body.
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Scientific experts

Directors

Carine GIOVANNANGELI (Dir IT Inserm)

Hugues LORTAT-JACOB (DAS CNRS)

Policy Officer

Imane LAHMAMI

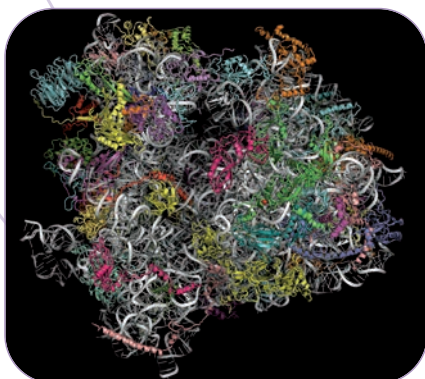
Experts committee

- ▶ Christiane BRANLANT (Nancy, ANR)
- ▶ Agnès DELMAS (Orléans, CNRS)
- ▶ Marie DOUMIC-JAUFFRET (Rocquencourt, INRIA)
- ▶ Sylvie FOURNEL-GIGLEUX (Nancy, Inserm)
- ▶ Jean-Luc GALZI (Strasbourg, INC CNRS)
- ▶ Jérôme GARIN (Grenoble, CEA)
- ▶ Yves GAUDIN (Gif-sur-Yvette, CNRS-Section 20)
- ▶ Germain GILLET (Lyon, Inserm-CSS1)
- ▶ Bruno ROBERT (Saclay, CEA)
- ▶ Gilles TRUAN (Toulouse, CNRS)
- ▶ Boris VAUZEILLES (Orsay, CNRS-Section 16)

Medical challenges

▶ Designing the therapies for future

Identifying the structure of a protein or an assembly of several proteins **sheds light on its role in a disease, and helps the development of drugs or prevention of resistance mechanisms.** This “fundamental” approach helps identifying mechanisms involved in pathological dysfunctions.



Crystal structure of the yeast ribosome.
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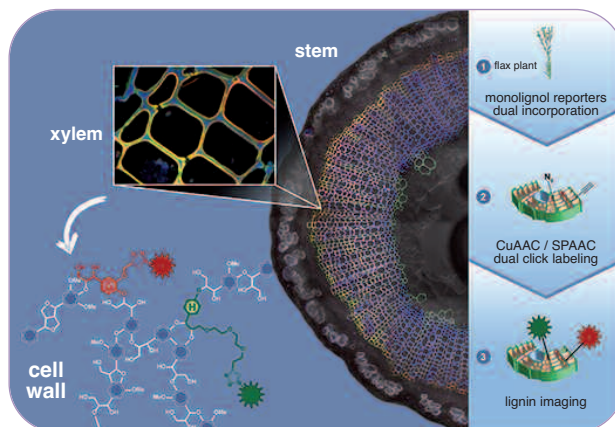
ITMO actions

- ▶ Support to Infrastructures: structural biology, Imaging, Proteomics, Bioinformatics
- ▶ Interdisciplinarity and training: support to workshops in chemical biology “MetBio, metals in biology”
- ▶ Collaborative Programme Aviesan “Next cancer cell map”, with ITMO Cancer (2018-2019)
- ▶ Participation in Chemical biology structuration with CNRS (November 2019, Lille)
- ▶ ITMO BMSV Symposia in 2018-2019: “How Cryo Electron Microscopy Meets Chemical Structure” (14-15 november 2018, Paris); “Microfluidics for Synthetic Biology and Health Applications” (6-7 december 2018 - Bordeaux); “Innovations in Mass Spectrometry for Cell Biology and Biomedical Research” (5 february 2019, Paris); “Synergies between modelling and experimental Approaches” (october 2019); “Physics for living systems” (december 2019).

Technological challenges

▶ Mimicking nature to protect it better

Production, from natural or bioinspired biological elements, or artificial systems that are endowed with a specific function is a key challenge for many fields in biology, **in particular molecular nanomachines.** Synthetic biology that mimics natural phenomena is promising in terms of technological advances, such as improved management of risks associated with chemicals **to reduce pollutants and toxic effects** from industry.



A Bioorthogonal Dual-Labeling Strategy to Unravel Lignification Dynamics in Plants.
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