

## Scientific scope of GRAL-2

Integrating structural and dynamical information at various scales is essential for understanding complex biological processes. GRAL-2 emphasizes the dynamics of living systems, including the assembly of protein complexes, their integration into functional operating systems, the kinetics of interactions between host and pathogens and the self-organization of cells into multicellular architectures such as tissues or organoids. Overall, GRAL 2 is divided into two main programs: 1) “Molecular Machines and Dynamics” and 2) “Self organization of Living Systems”.

### 1. Molecular Machines and Dynamics:

The objective of this program is the comprehensive analysis of molecular machines focused but not limited to the following processes: (i) microbial host-pathogen interactions, (ii) immunity and infection, (iii) membrane transport and signalling, or (iv) epigenetics, chromatin and cancer. The development of methods used to study these complex machineries is also in the scope of this call. These include among others: NMR, X-ray crystallography, atomic force microscopy, single molecule fluorescence technologies, neutron and X-ray scattering, optical and electron microscopy, native mass spectrometry techniques and/or molecular dynamics simulations.

### 2. Self-organization of Living systems:

A central property of living systems is their capacity to self-organize. The objective of this program is the study of the dynamic properties of self-organization during morphogenesis and in response to environmental cues in different organisms such as bacteria, yeast, microalgae, flies, human cells or plants. The following areas of research are covered by this program: (i) multicellular assemblies (organoids, tissues etc.), (ii) dynamics of macromolecular complexes (protein, DNA, RNA etc.), (iii) chloroplast biogenesis and function, and (iv) dynamics of subcellular architectures (membranes, organelles etc.).

To reach these objectives and bridge the scales from molecules to tissues to organisms, GRAL-2 launches its first call for proposal to fund PhD scholarships.