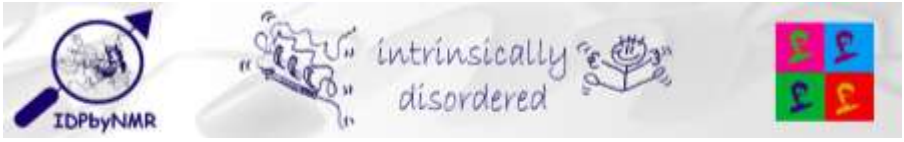

Intensive Training Course

NMR methods for the study of structural order and disorder in proteins

The second ITN Science and Technology course took place from 9 -14 September 2012 in Les Houches (France) in the French Alps (close to the Mont Blanc Massif). The course was co-organized by partners 1 (CERM Florence) and 2 (CNRS-IBS Grenoble).

The course brought together a total of **56** young scientists and more senior lecturers from 11 different European countries. The 56 participants were composed of 22 members from the IDPbyNMR partner laboratories, 10 invited speakers, and 24 students and postdocs form research groups that are not directly involved in the IDPbyNMR ITN network.

The course focused on theoretical and practical aspects of modern multidimensional NMR spectroscopy and molecular modeling, with a particular emphasize on applications to Intrinsically Disordered Proteins (IDPs) that play important roles in many cellular processes, and are involved in human pathologies such as cancer and neurodegenerative diseases (Alzheimer, Parkinson, …). NMR spectroscopy provides a unique tool to study these molecules at atomic resolution in their free and aggregated (oligomers, fibrils) states, as well as the detailed investigation of disorder to order transitions when the IDP interacts with binding partners.

The 90-min lectures of invited speakers were devoted to a historical overview of biomolecular NMR, NMR data acquisition and processing, assignments strategies, pulse sequence design, the discussion of NMR observables for IDPs, the study of protein dynamics from NMR relaxation, in-cell NMR approaches, and some example NMR studies of IDPs such as α-synuclein and tau. Additional 45-min lectures were given by representatives of the IDPbyNMR network on NMR sample preparation, fast data acquisition techniques, ^{13}C-direct detection approaches, the calculation of structural ensembles from RDCs and chemical shifts, and NMR hardware. Finally all ITN fellow students presented a progress report of their particular research project during dedicated student sessions. Handouts of lectures were made available to all participants on the IDPbyNMR intranet.

The scientific program deliberately left plenty of time in the afternoon and evening for scientific and personal exchange between the students and the senior scientists present.

The feedback from the participants as judged from the filled questionnaires was extremely positive both with respect to the quality of the lectures as well as the overall setting and organization of the course.