

ITACA.SB (Potentiating the Italian Capacity for Structural Biology Services in Instruct-ERIC): Strengthening the Italian structural biology node: a cornerstone for nanomedicine

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Structural characterization serves as a foundational pillar in developing innovative nanomedicine strategies, providing critical insights into the relationships between the structure and function of complex biological system and their biomedical applications. At its core, this field seeks to decipher the intricate interplay of atoms, bonds, and molecular interactions that govern biomolecular systems function and behavior. Unraveling this orchestrated interaction requires a multidisciplinary approach, integrating expertise from biology, chemistry, physics, mathematics, and computational science. Each discipline contributes unique tools and perspectives, collectively enhancing our comprehensive understanding of molecular structures and mechanisms.

In this context, in November 2022 started the expansive 10-year initiative ITACA.SB (<https://www.itaca-sb.it>).

The PNRR project ITACA.SB is the result of a synergistic collaboration between the National Research Council of Italy (CNR) and the University of Florence. This alliance brings together several long-standing research institutes of the CNR and the Center for Magnetic Resonance (CERM) of the University of Florence, a world-renowned center for Nuclear Magnetic Resonance studies on molecules.

With an initial funding of €18 million, ITACA.SB now represents a national research infrastructure empowering the biomedical research community with up-to-date instrumentation, knowledge, and methodologies to meet rigorous international standards. As a result, researchers benefit from direct access to a wide range of essential experimental and computational techniques and expertise, enabling them to pursue the latest developments in fields where structural studies are critical, such as structure-based drug design and other emerging applications. Available techniques include, but are not limited to, Transmission Electron cryo-Microscopy (cryo-TEM), Molecular Crystallography (MX), Nuclear Magnetic Resonance (NMR), Small Angle X-Ray Scattering (SAXS), Mass Spectrometry (MS), and Molecular Dynamics (MD).

Finally, ITACA.SB is dedicated to education, by providing new generations of scientists with specialized schools, workshops, and tailored high-level hands-on internships on cutting-edge instrumentation.