

ISS - Core Facilities



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<https://corefacilities.iss.it>

Scientific Computing

Proteomics

Cell Factory
FaBioCell

Sequencing

Core
Facilities

Microscopy

Citometry

NMR

EPR

Scientific Computing
Pietro Chistolini

Cell Factory FaBioCell
Carmela Rozera

Citometry
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EPR
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Rossella Canese

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Fiorella Ciaffoni

Mission

- Support to the strategic management of the equipment available in the ISS.
- Design and construction/development of instruments and new technologies.
- Streamlining the use of high-cost technologies to be shared within the ISS.

All Core Facilities do research within their spheres of interest.

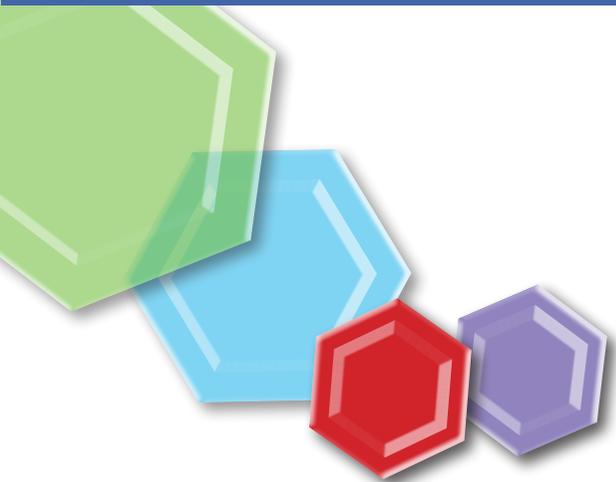
Vision

The Core Facilities promote the improvement in competence and technological capability of the ISS, and contribute to increase its competitiveness in advanced biomedical research and its role as a scientific reference for the Country. Multidisciplinary expertise favors the provision of technologically advanced services and the development of research of excellence, whether independent or in close collaboration with other institutions.



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Scientific Computing

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High-Performance Computing (HPC), development and implementation of parallel algorithms. Design, optimization and control of methods, tools and systems aimed at processing data flows generated by scientific biomedical instruments, digital sources and databases. Algorithm implementation on multi-core, multi-CPU, multi-GPU architectures. Applications and libraries of machine learning, artificial intelligence and Bayesian networks.



Cell Factory FaBioCell

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FaBioCell is a cell factory authorized by the Italian Medicines Agency (AIFA) for the production of cell therapy products. It works in conformity with the “current Good Manufacturing Practices” (cGMP), the European guidelines regulating the activities related to the production of pharmaceutical drugs, including experimental drugs. The cell factory offers services for GMP validation of experimental protocols, and for the production and quality control of cell drugs. The facility also offers support for the preparation of documents to be submitted to the regulatory agencies for the authorization of clinical trial protocols.



EPR

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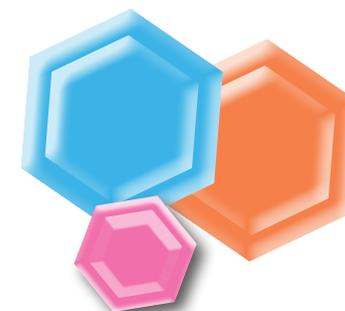
The Electronic Paramagnetic Resonance (EPR) Area is equipped with four spectrometers operating in continuous wave X-band, one being an ultra-high sensitivity instrument. EPR is applied, in vitro/ex vivo, to the study of free radicals, oxidative stress, antioxidants, protein structures, membranes, metalloproteins, radiation damage, pre-clinical research into degenerative diseases and tumors. As for radiation damage, the Area has expertise and instrumental equipment for ionizing radiation detection and dosimetry; for the study of oxidative stress, biochemical and immunochemical techniques are applied.

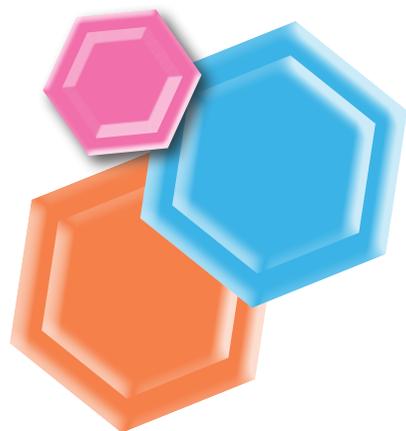


NMR

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The high-resolution Nuclear Magnetic Resonance (HR-NMR) Unit is equipped with a spectrometer operating at 9.4 T for metabolism and metabolomics studies in cells, biological fluids and tissues. The preclinical Magnetic Resonance Imaging (MRI) Unit is equipped with an MRI system operating at 4.7 T for morphological, molecular and functional imaging and spectroscopy studies on rodents in vivo. The area has developed multidisciplinary skills in oncology, neuroscience, aging and metabolic diseases.





Proteomics

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The Proteomics Area uses mass spectrometry (LC-MS/MS), immunometric techniques (Luminex), and Reverse-Phase Protein Microarrays (RPPA). LC-MS/MS analysis can be applied to identify and characterize semi-purified proteins, detect post-translational modifications and adducts, and to thoroughly analyze complex protein mixtures. It can also be used for qualitative and quantitative investigations of total proteomes and subcellular compartments, biomarker discovery, and analysis of protein complexes. The area relies on its expertise in biological sample preparation and bioinformatics. RPPA is suited for in-depth analysis of signal transduction pathways. The relative measurement of pathway activation levels is performed simultaneously on hundreds of protein extracts, via immunostaining with up to 400 validated antibodies.

Microscopy

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Within the Microscopy Area, the Confocal Microscopy Unit is equipped with a laser scanning confocal microscope for a wide range of applications: from cells to tissues, from intact organisms to nanovesicles. The staff have long-term experience with pre-clinical research in oncology, immunology, neurosciences and genetic diseases. The Electron Microscopy Unit is equipped with a field emission scanning electron microscope (INSPECT F-FEI) and a transmission electron microscope (PHILIPS 208S EM-FEI) for ultrastructural analyses in the life sciences. The expertise of the unit spans from microbiology and parasitology to cell biology. Standard electron microscopy methods are used for morphological studies, and immunolabelling studies for antigen localization by both TEM and SEM.

Sequencing

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The Sequencing area is equipped with an Ion Torrent PGM system for Next Generation Sequencing. The Ion Torrent Technology represents a fast, simple and accessible sequencing solution that ensures robust and reliable results.

The Ion Torrent PGM technology is mainly indicated for the following applications:

- Microbial sequencing (DNA, RNA, also de novo).
- Targeted DNA and RNA sequencing based on the Ampliseq technology.
- Small RNA and miRNA sequencing.

Citometry

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The Cytometry Area is equipped with three analyzers, two cell-sorters and Single-Cell Mass Cytometry (CyTOF). The staff have expertise in a wide range of cytometric techniques and offer qualified support in the design of the most appropriate multiparametric labelling panels, data processing and interpretation of analyses. Besides a Cell Sorting service, the facility provides support to the conception, planning, and data analysis to develop new experimental approaches. High-throughput multi-parameter cytometric analyses can be run in the facility's laboratory.

