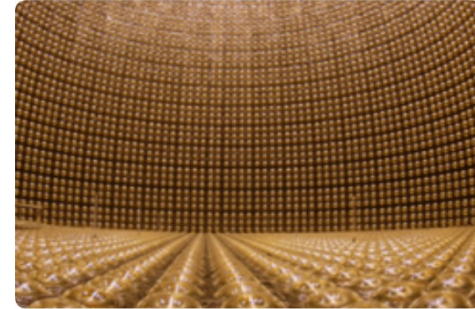


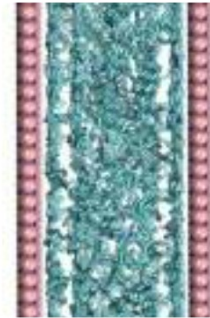
About August Chełkowski Institute of Physics

Topics

- Theoretical Physics, Molecular Physics, Condensed Matter Physics, Nuclear and Particle Physics, Astrophysics and Cosmology,
- Nanophysics, Biophysics, Medical Physics, Physics of Pharmaceuticals

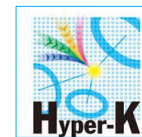


$$\begin{aligned} & \sum_{i,j} c_{ij} |i\rangle A \otimes |j\rangle B \\ & t_n(x) = (-1)^n e^{x^2} \frac{d}{dx} \\ & \psi(x) = A e^{ikx} + B e^{-ikx} \\ & U(t) = \exp\left(\frac{-iHt}{\hbar}\right) \\ & P(a,b) = \int d\lambda \end{aligned}$$





SOLARIS
NATIONAL SYNCHROTRON
RADIATION CENTRE



International cooperation:

- Large Scale Infrastructure:
 - National Synchrotron Radiation Center Solaris,
 - Centrum Cyclotronowe Bronowice,
 - Supercomputer in the ICM Warsaw;
 - CERN;
 - J-PARC: Japan Proton Accelerator Research Complex – neutrino physics;
 - NIST Center for Neutron Research (USA);
 - MAMI – akcelerator elektronów w JGU Mainz (Niemcy);
 - The European Synchrotron.
- Polish-French MSc programi

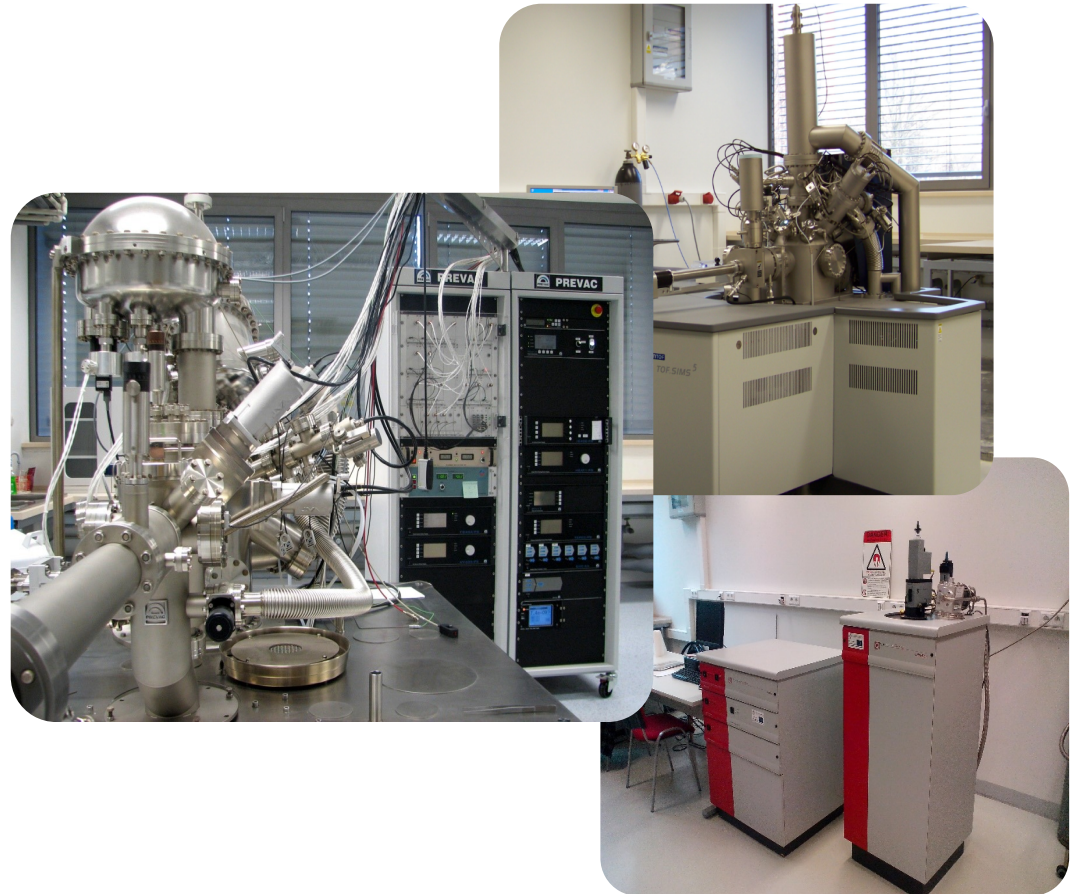


Some of our Scientific Teams

Condensed Matter Physics Team

The team investigations are focused on modern intermetallic compounds for different applications, including magnetic materials (bulks, nano-powders and nano-composites), ferroelectric materials, thermoelectric technologies and surface devices for modern electronics.

The team is equipped with high level technology and measurement systems, allowing characterizing, among others crystal structure, surface morphology, electronic structure and magnetic properties.



Study of the structure, dynamics and phase transitions of complex molecular systems and nanosystems

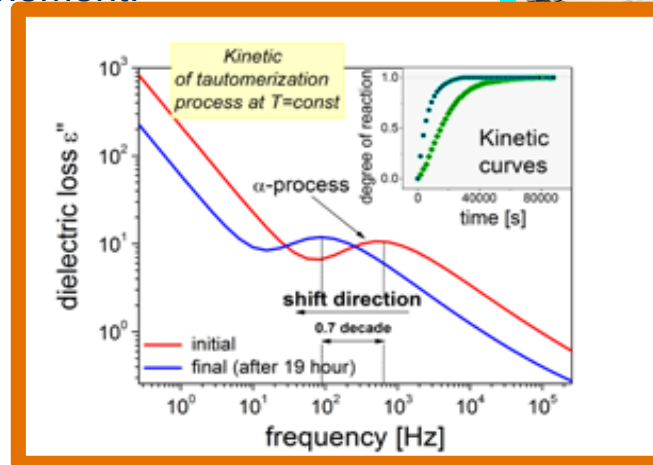
Molecular dynamics/properties of:

- **Small molecular liquids,**
- **H-bonded materials,**
- **Ionic liquids**
- **Polymers,**
- **Ceramics,**
- **Pharmaceutics,**
- **MOFs**

studied at various p-T conditions and e.g., in confinement.

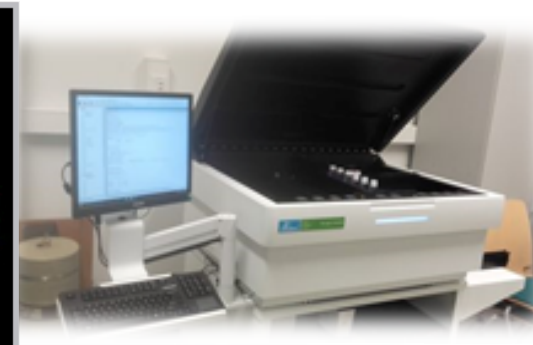
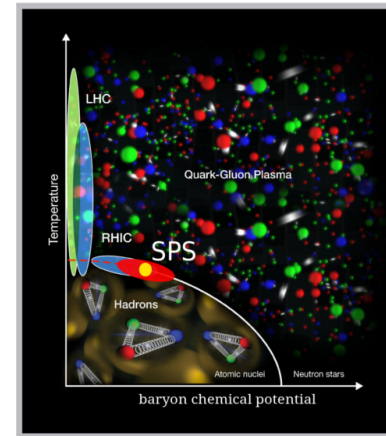
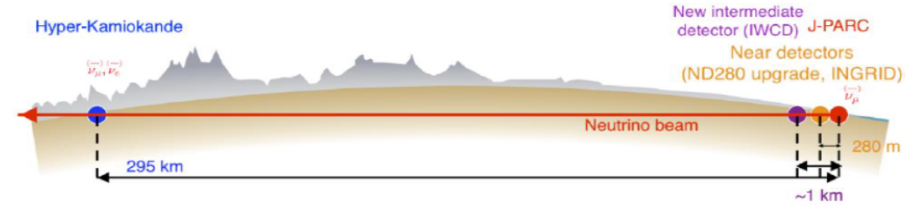
Experimental methods:

- **Broadband Dielectric Spectroscopy at low and high pressure conditions**
- **X-ray diffraction**
- **DSC**
- **Molecular Dynamics**
- **Infrared and Raman spectroscopy**



Nuclear physics in interaction studies and

- Experimental studies of a few nucleon systems – a way to understand nuclear interactions
- Studies of neutrino properties, including getting closer to explaining matter-antimatter imbalance in the Universe in neutrino oscillation experiments T2K and Hyper-Kamiokande, J-PARC/Kamioka, Japan
- Searches of the quark-gluon plasma creation and transition between two phases of strongly interacting matter (quark-gluon plasma and hadron gas) in the NA61/SHINE experiment at CERN, by performing the scan heavy-ion collisions.
- Mössbauer spectroscopy of ^{57}Fe and ^{119}Sn – a technique to study nuclear structure with the absorption and re-emission of gamma rays to identify the valence state of Fe/Sn in a given site and individual material.
- Nuclear α , β , γ - spectrometry techniques in environmental and medical research - in the laboratory and 'in situ'.



Programs of study:

- **Physics (bachelor, master)**
- **Biophysics (bachelor, master)**
- **Medical Physics (engineer, master)**
- **Micro and Nanotechnology (engineer, master)**
- **Applied Computer Science (engineer)**