

The uncharted workshop is a great source of ideas.

DEVELOPMENT OF RESEARCH EQUIPMENT IN ATOMKI



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The **Institute of Nuclear Research** of the Hungarian Academy of Sciences (**ATOMKI**) has been developing research equipments for decades. **The main branches of development are:**

- nuclear instruments
- mass spectrometers
- electron spectrometers
- high voltage power supplies
- semiconductor X-ray and Gamma-ray detectors
- electronic measurement and control equipment
- vacuum system components: chambers, fittings, pumps, gauges, etc.
- data acquisition and analysis.

The development work is done by a team of 25 engineers and physicists, and the manufacturing work is carried out by some 40 technicians and skilled workers in the following **facilities:**

- 1600 m² mechanical workshop space with 60 universal machines
- 200 m² laboratory space for electronic development equipped with computers for computer aided design (CAD)
- 200 m² laboratory space for vacuum technology development
- 100 m² laboratory space for detector development
- 200 m² office space for mechanical design and drafting
- 200 m² workshop space for production of electronics

Development projects are carried out with the help of a CAD-CAM system. Computerized storage rooms provide immediate access to spare parts and materials. When no major projects are going on in the Institute we can place our free capacity at outside parties disposal.

We offer our expertise in:

- developing special instruments
- prototype and small scale serial production
- preparation of mass production
- developing of special measurement and control systems
- maintenance and service of special research equipments.

We are also ready to help to work out ideas of individual entrepreneurs and inventors, and we are willing to manufacture prototypes or experimental models. We offer our research and development facilities to small companies and individual entrepreneurs and they can also count on the help of our development personnel experienced in international co-operation.

The mechanical workshop is equipped with machinery for:

- cold forming and machining of stainless CrNi steel, Al-alloys and a number of special material (tantalum, nickel, molybdenum, glass-ceramics, etc.)
- arc cutting of metal (0-50 mm), welding (0.05-5 mm) in Ar atmosphere for ultra high vacuum requirements
- He and Ar leak testing of pressurized or vacuum vessels.

Typical products:

- components of high and ultra vacuum systems (10^{-4} - 10^{-9} mbar)
- manual and pneumatic vacuum valves, gate valves (10^{-3} - 10^{-9} mbar)
- oil diffusion pumps (150-4000 l/s)
- ion getter pumps (2-150 l/s).

In the department of electronics the development work is based on a CAD system installed on IBM computers, using laser printers, digital plotters and scanners. Two-sided printed circuit boards of special electronic units with through hole plating are routinely produced. Our products are available either in NIM or CAMAC standards or in custom made forms.

Typical products:

- electronic units for energy and time spectroscopy instruments
- multichannel nuclear amplitude analyzers with supporting units (live time correctors, pile-up eliminators, etc.)
- analogue and digital signal processors
- high voltage, high-stability power supplies (1-30 kV) with computer control
- electronic units for quadrupole mass spectrometers
- low noise electrometers, preamplifiers
- vacuum gauges, electronic modules for automatic control.

In the vacuum technology laboratory we design, test and install vacuum pumps, vacuum system components and complete vacuum systems. We are ready to work out special mass spectroscopic measurement techniques to design and install systems for special measurements and to carry out the measurements. Gas chromatograph combined with a mass spectrometer can be developed for special requirements.

Typical applications:

- mass spectroscopic measurement of gases in fermentation processes
- measurement of gases dissolved in living plants
- analysis of gases from thermo-reactions.

In the detector development laboratory we produce and service *Si(Li) detectors* for spectroscopic purposes. Slicing, profile-boring, etching of Si-crystals, and vacuum evaporation of Au, Li, Al can be performed. With our *X-Ray Fluorescence* equipment we can perform X-ray analyses of powder liquid or solid samples and detect concentrations of elements of a few ppms. The analyses are backed by processing and evaluating software packages.

In the **cryophysical laboratory** devices based on superconductivity are developed including special superconducting magnets and ultrasensitive voltmeters and magnetometers. Cryotechnical equipments for industrial and laboratory use are designed and built. Maintenance and repair of Dewar vessels and laboratory nitrogen and helium liquifiers are performed.

Typical products:

- SQUID magnetometer and picovoltmeter
- superconducting magnets
- laboratory helium cryostats, continuous-flow helium cryostats

In the **electron spectroscopy laboratory** special, high-resolution spectrometers are designed and built, and special electron-spectroscopic investigations are carried out. These instruments are applied in

- atomic collisions studies,
- identification of free molecules,
- depth profiling and surface analysis,
- X-ray Photoelectron Spectroscopy (XPS) for chemical analysis,
- chemical state identification.

Typical devices:

- hemispherical and cylindrical mirror electron spectrometers with high energy- and angular-resolution
- auxiliary electron optics (electron transport and retarding lenses)
- UV- and X-ray photon sources
- ultra high vacuum chambers for sample preparation, transfer and analysis,
- special electron detectors and preamplifiers
- measurement-control and data acquisition hardware and software
- program packages for data evaluation.

In the laboratory of **accelerator development** we design and manufacture custom-made beam transport elements for low- and medium-energy particle accelerators. Upon the specification of the physical and technical parameters by our customers an immediate offer can be given on the following units:

- analyzing and deflection magnets
- switching magnets
- electrostatic and magnetic quadrupole lens systems
- vacuum chambers, pumping systems and stabilized power supplies.

Based on our experience in the field of Proton Induced X-ray Emission analytical technique PIXE chambers to be used both in internal and external beam irradiation mode are also available from this laboratory.

For more information about our products and services please contact:

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