

KFKI RESEARCH INSTITUTE
FOR PARTICLE AND NUCLEAR PHYSICS
OF THE HUNGARIAN ACADEMY OF SCIENCES

Budapest, Hungary

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Director: Zoltán Szőkefalvi-Nagy



HISTORY

The KFKI Research Institute for Particle and Nuclear Physics (RMKI) of the Hungarian Academy of Sciences became an independent legal entity on 1st January 1992.

Earlier, in the 1975-1991 period, RMKI, as an institute with the same name as today, worked within the framework of KFKI (Central Research Institute for Physics of the Hungarian Academy of Sciences). At that time KFKI comprised five, later four research institutes. The KFKI itself was founded in 1950.

MISSION OF KFKI RMKI



Experimental and theoretical basic research in nuclear and particle physics, plasma physics, atom optics, cosmic physics, nuclear solid state physics, nuclear materials science and application of physics in bioscience

Development in the fields of laser physics, nuclear analysis, space technology, fast data processing and evaluation, spectroscopy, dedicated electronics and software

Operation of the accelerator system composed of the 5 MV Van de Graaff and the 500 keV Heavy Ion Cascade accelerators and the Molecular Beam Epitaxy (MBE) device.

Operation and developing of the computer network for the whole KFKI Campus



MAIN STATISTICAL DATA

Staff: 188 (including ~ 130 research fellows)

Annual budget (2004): 1439 million HUF (5.7 million EUR)

core funding from HAS: 987 MHUF

National Research Fund: 124 MHUF

contracts (tenders): 328 MHUF

Number of publications in SCI journals (2004): 161

Staff members teaching in universities: 40

RESEARCH ACTIVITIES



Nuclear Solid State Physics

fundamental research on condensed-matter systems of potential technological application utilising nuclear methods, methodological development of nuclear techniques for solid-state physics and materials sciences

Theoretical Physics

Theory of gravitation, field theory and particle physics, high energy heavy ion collisions, few body problem

Plasma Physics

tokamak edge plasma physics, plasma diagnostics
laser physics, atom optics

Space Physics

solar wind interactions with planets and solar system bodies, the physics of the geospace
spacecraft instrumentation

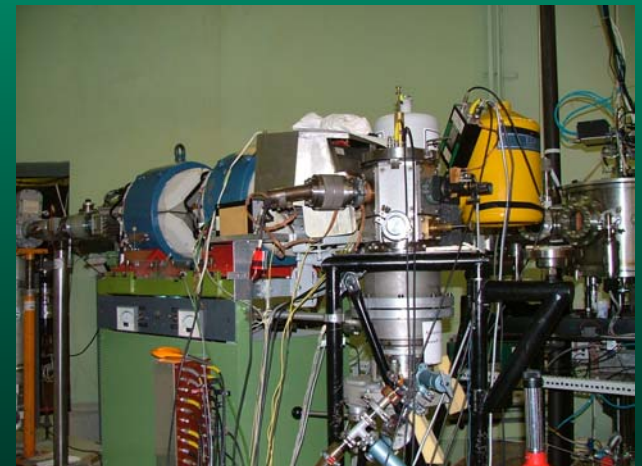
Biophysics

computational neuroscience
elemental analysis of biological and environmental samples

High Energy and Heavy Ion Physics

Hungary is a member state of CERN interested both in physics and engineering
major experiments with the participation of co-workers of KFKI RMKI: OPAL, NA49, LHC ALICE and CMS
(preparatory state) RHIC PHENIX, the LHC Grid project
Engineering: fast data links

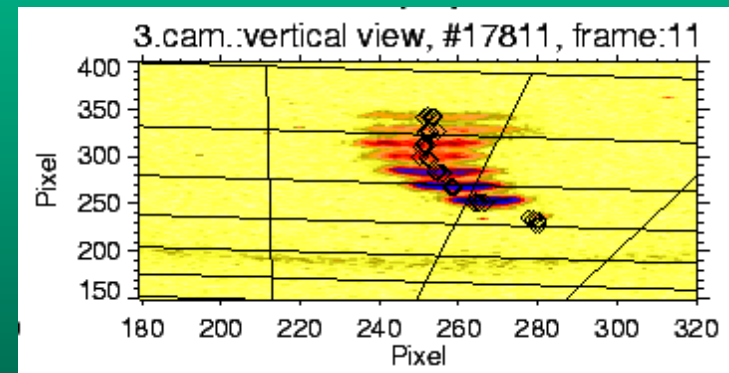
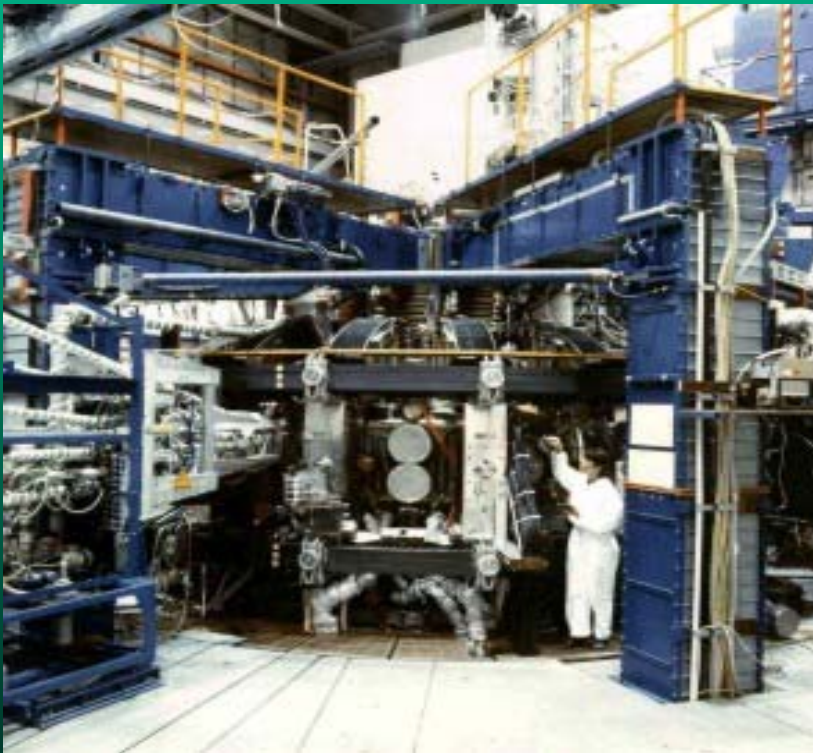
THE ACCELERATOR COMPLEX



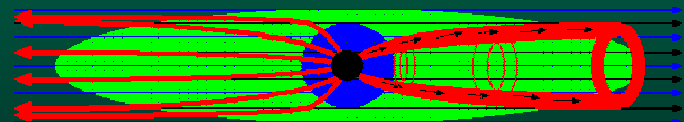
THE MOLECULAR BEAM EPITAXY MACHINE



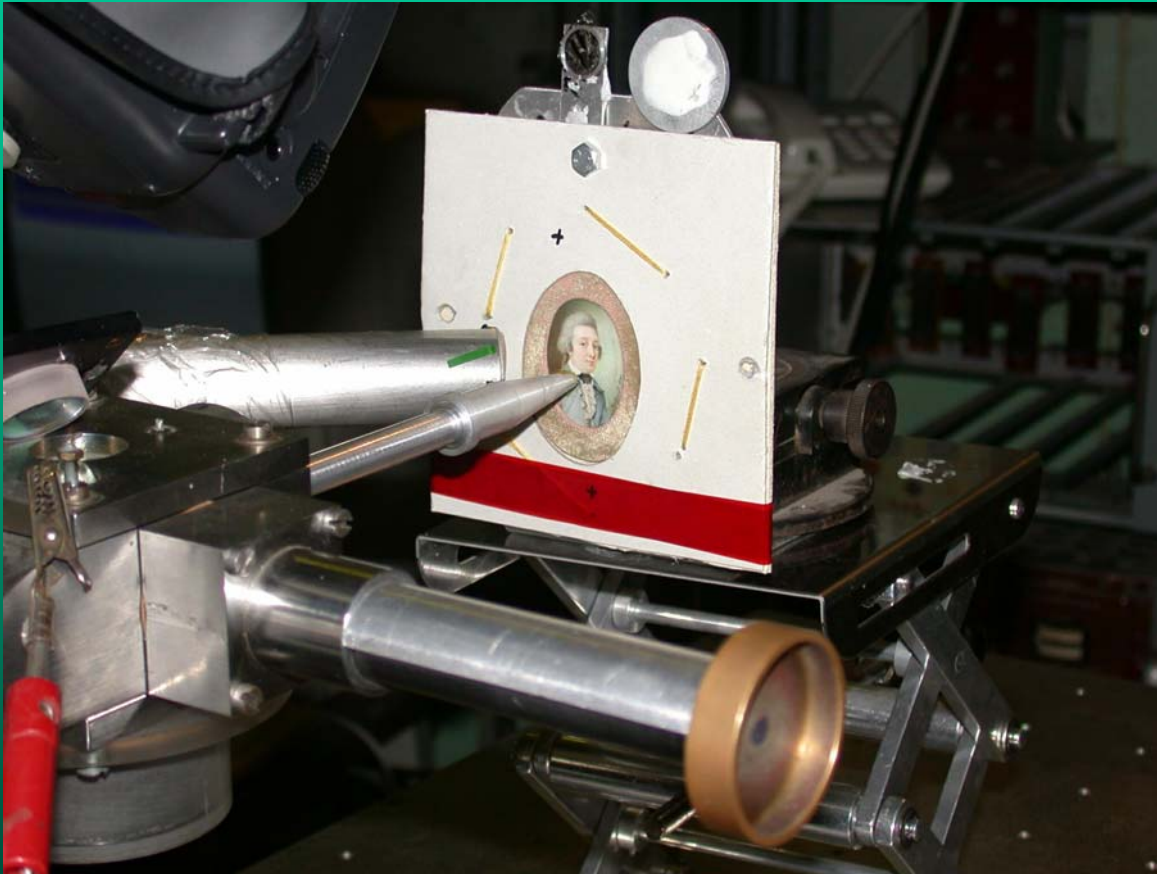
KFKI RMKI is the coordinator of the Hungarian EURATOM Association for controlled fusion research since 1999



Observation and simulation of pellet ablation in tokamak plasma



Preservation of cultural heritage



External-beam PIXE analysis of a miniature

Space Research



Space Physics: measurement, theory, simulation

- Solar wind phenomena
- Solar wind interaction with planets and comets
- Plasma environment of planets and comets
- Solar and galactic cosmic rays

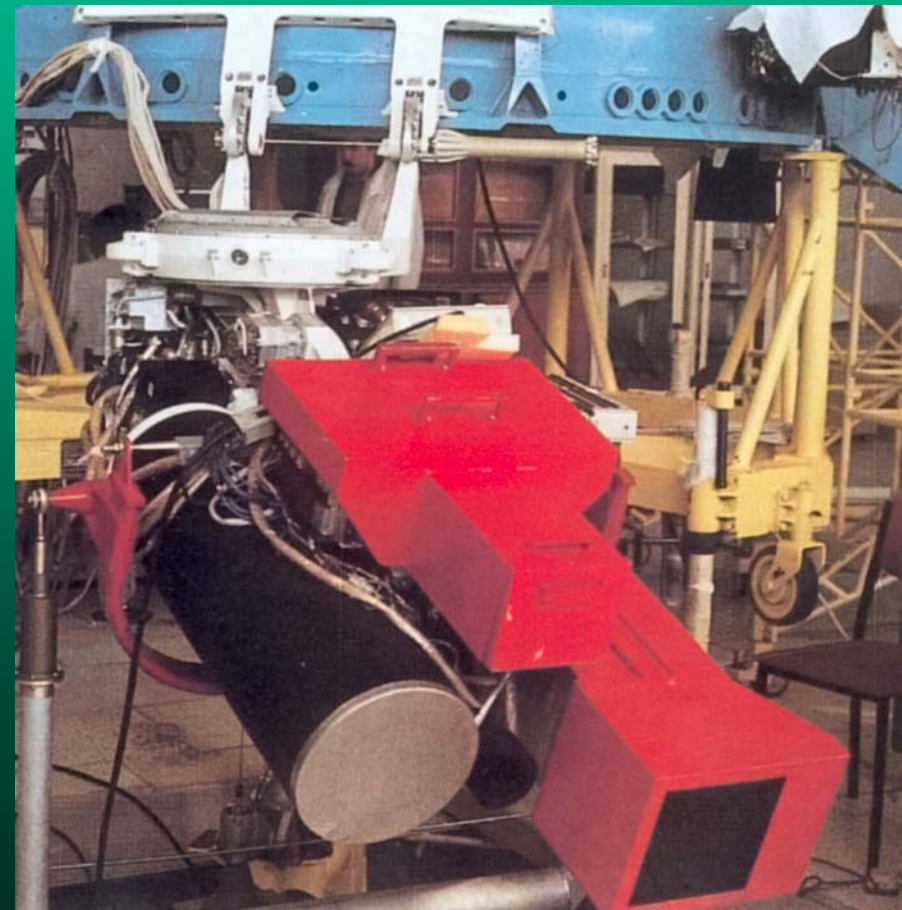
Space Technology: instrumentation

- Onboard fault tolerant data acquisition systems
- Ground support equipments
- Power converters
- Onboard software design

Space Research



- VEGA 1&2
 - 1984 December
 - 1986 March
 - Imaging & orientation system
 - ✓ Double redundant system, different technology
 - ✓ Robot on image processing
 - ✓ Observation of the comet nucleus
 - Charged particle detectors
 - identification of new particle acceleration



Space Research



- Phobos
 - 1988 July
 - Mars & its Phobos moon
 - Hyperbolic particle analyser
 - Fault tolerant data acquisition & control computer for the lander

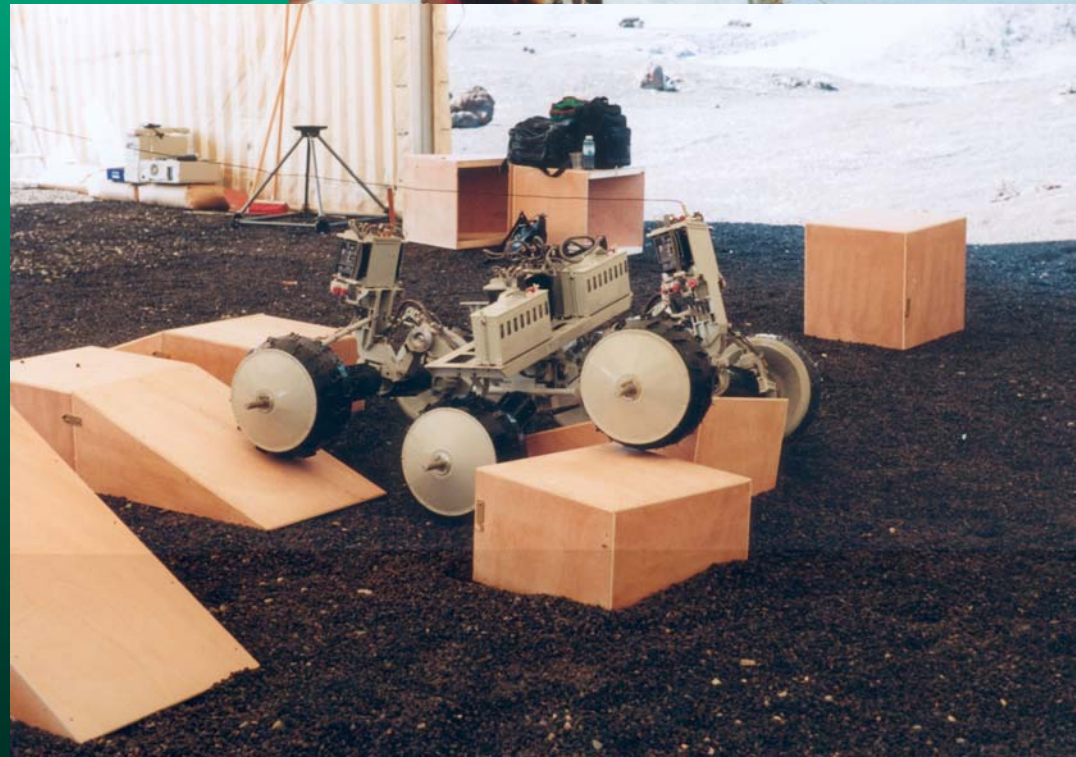


Space Research



- Rover

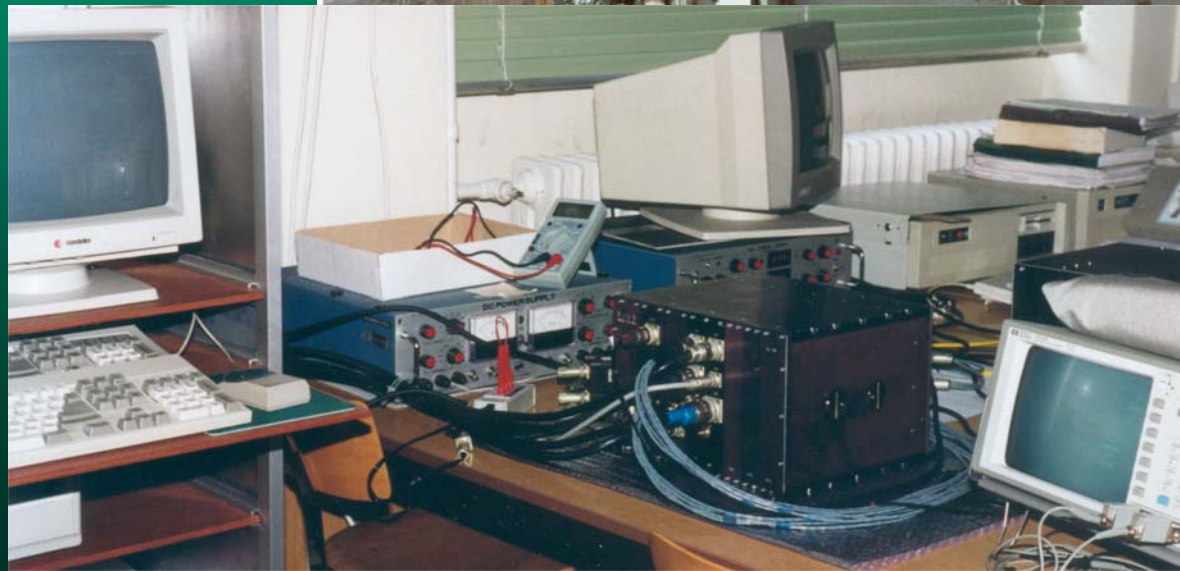
- 1992 – 1997 demonstration version
- International contribution:
 - French, Russian, Spain, Hungarian
- Distributed computing system



Space Research



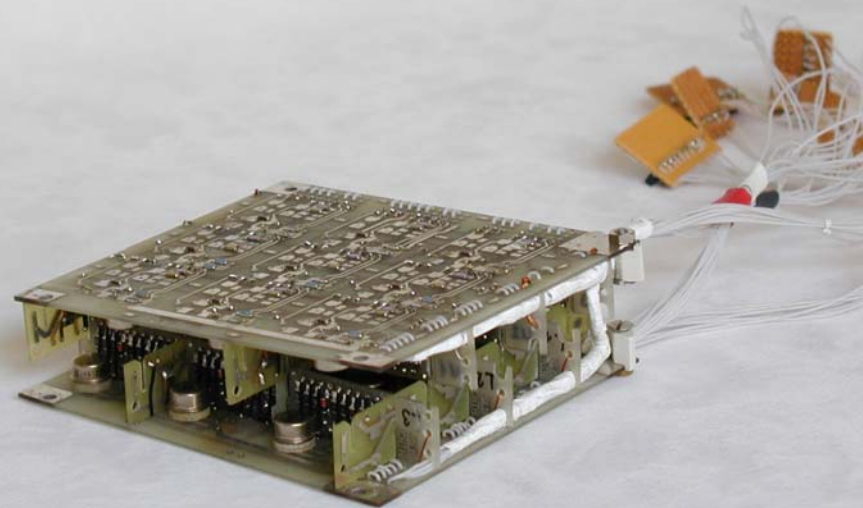
- Spectr X-ray
Gamma
 - 1991 - 1997
 - Central Data
Acquisition and
Control computer
 - ✓ Double redundant
 - ✓ Continuous control



Space Research



- Rosetta
 - 2004 March
 - 2014 encounter (synchron orbit)
 - Fault tolerant central data acquisition and control system for the Lander
 - Orbiter Plasma sensor power switch unit



Space Research



- Data acquisition system of PWC for ISS
 - 2008 March
 - Two computer outside



Possible Contribution



- Mechanics
 - Design, manufacturing of high-precision equipment
 - Testing
- Electronics
 - Embedded processors, FPGA design
 - Optical signal processing
 - Printed board manufacturing
- Software development
 - Assembly, C, C++ languages
 - task-specific real-time o.s.
- System integration

