Institute for Nuclear Physics

Basic information

Single location
28,000 m^2
area

14 buildings
20,000 m^2

3 pahases
of constuction
1953-54
1969-71
1983-84

- Personnel
  - 200 employe,
  - 100 researcher,
  - 60 PhD,
  - 20 professor,
  - 3 members of HAS

History

- Founded: 1954, like other nuclear physics institutes all over the world
  - Indirect evidence on existence of neutrino
  - Discovery of uranium ore in southern Hungary

- '70-s ATOMKI became a center for accelerator based nuclear physics
  - 1MeV, 5MeV Van de Graaff accelerators were constructed
- '80-s K=20 cyclotron (p, d, ^{3}He, ^{4}He) was obtained, stand alone ECR
- 2015 2MV HV tandem accelerator was bought

Large investment projects from 2016

- Creation of a world-class research environment in the ATOMKI Tandetron Laboratory
- Development of the research infrastructure for exotic nuclear processes
- Infrastructure for an Excellent Regional Laboratory of Material Science
- Construction of the Heritage Science Laboratory of ATOMKI
- Center for Isotope Climatology and Environment Research
- GEOCORE geological knowledge center
- INTERACT Radiocarbon Competence Center

ATOMKI a European and national laboratory for accelerator based sciences

ATOMKI not only participates in accelerator based Horizont Europe projects

- Radiate, Multiscan3D, Iperion, Paris

but became a service provider, too

- European Research Infrastructure for Heritage Science (IBA,C14)
- International Carbon Observatory System (GHG)
- Chemical Elements as Tracers of Evolution of Cosmos
- Europlanet (molecular astrophysics)
- EUROpean Laboratories for Accelerator Based Science (ECR)

E-RIHS

ICOS Integrated Carbon Observation System

ChETEC Action

europlanet

Mission

Conducting nuclear physics research and applying nuclear technological methods in various fields of science, primarily in space research, material, environment and heritage science, in addition participation in high-level professional (PhD) training.

Departmental structure

- ATOMKI has 3 departments
  - Department of Nuclear Physics
  - Department of Isotope Climatology and Environment Science
  - Department of Applied Physics
- The departments are subdivided into groups
  - All together there are 14 research groups

Research departments: Nuclear Physics

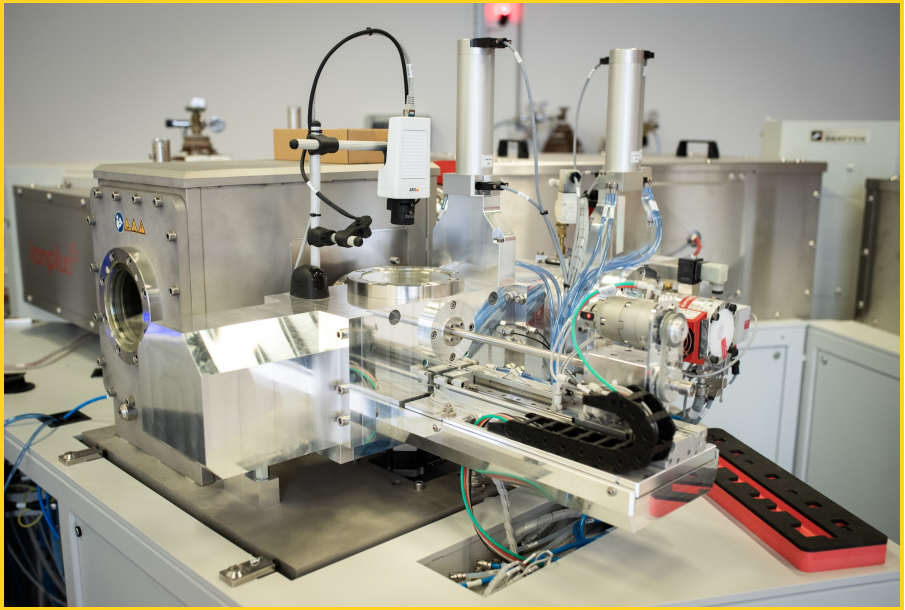
Traditional basic research direction performed mainly at large international laboratories

- Experimental Nuclear Physics (AGATA, Sunflower, NeuLand)
  - Rotation, drip line nuclei, decoupling, single particle states
- High Energy Nuclear Physics (CERN, Brookhaven, detectors)
- Nuclear Astrophysics (LUNA, Borexino, b-RIKEN, ATOMKI)
- Theoretical Nuclear Physics
  - Symmetries, entanglement / correlations, clustering
- Fundamental Interactions (X-17 anomaly)

Isotope climatology and environment research

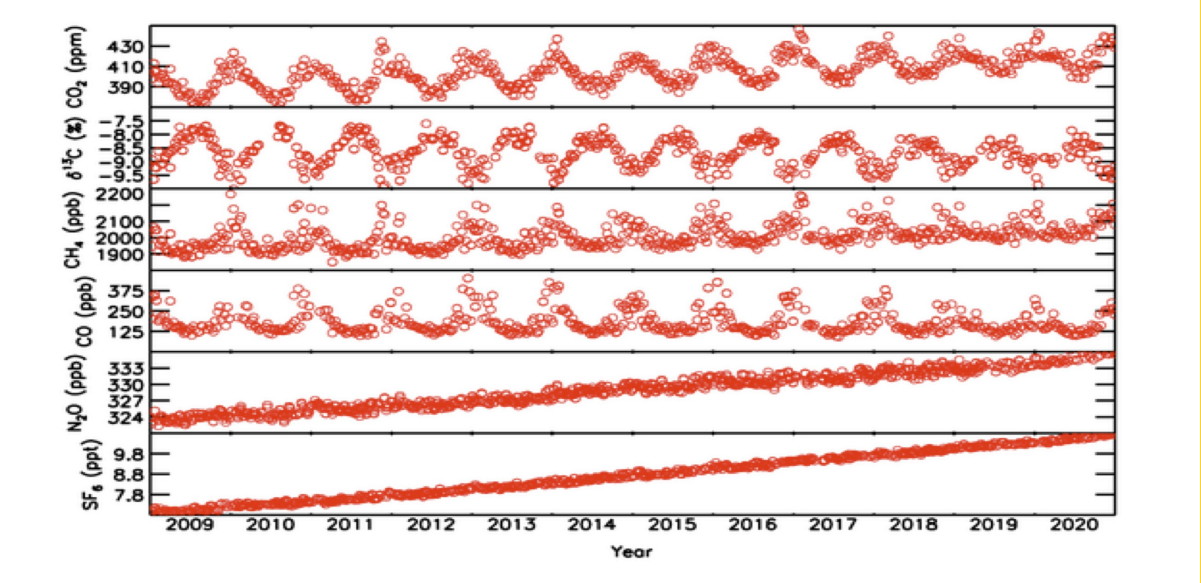
A newly established department to serve the society

- Environment research
  - GHG, aerosol, underground/surface water
- Paleoclimatology
  - Isotope ratios as tracers
- Geochronolgy (K/Ar, Ar/Ar, U/Th)
- Heritage Science
  - IBA, XRF, microscopy
- Radiocarbon Competence Center
  - Air quality monitoring of the city



Green house gases

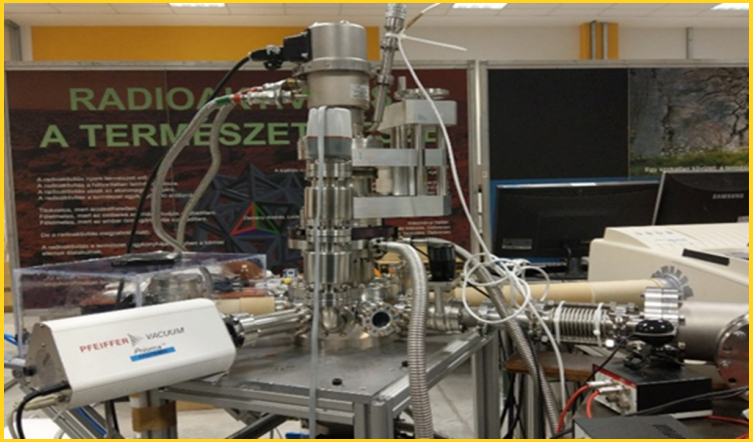
- Climat monitoring in European and world wide networks



Research departments: Applied Physics

The technology oriented areas

- Nuclear technology
  - Data, wear, radiochemistry
- Surface science
  - Functional materials, thin layers
- Space chemistry
- Laser induced fusion (d,d)



Nuclear material science

On the basis of the experience in surface science and nuclear technology by merging the two directions

- Production of new materials and surface layers by irradiation:
  - Ion implantation - surface functionalization
  - Electron beam - non-adiabatic powder metallurgy
  - High intensity electron pulse - surface treatment, surface alloying
- Qualification of new materials and surfaces produced
- Wear and corrosion tests (IAEA, ACCT)

Space related irradiation center

- Expansion of the irradiation infrastructure
  - Cyclotron, Co-60, tandetron, ECR
  - Low-energy (100 kV) heavy ion accelerator
  - Low energy electron accelerator
- Expansion of related testing capacity
  - Radiation chemistry - support for long-term space missions
  - Complex space simulation (cold + vacuum + radiation)
- Establishing a European laboratory space center within the SpaceSci project