THE INSTITUTE OF ATOMIC PHYSICS

Managing Director
PhD. **Theodor Ionescu-Bujor**

Brief Presentation

The Institute of Atomic Physics was established as legal entity in 1990 year by taking over a part of coordination activities in the nuclear field from the State Committee for Nuclear Energy and the Central Institute of Physics. Since 1999 when the Contract of Association at Euratom has been signed, the institute coordinates the Romanian nuclear fusion activities carried out in the European Fusion Programme that is accomplished within the Framework Programmes of the European Union. The participation to the European Fusion Programme is performed by projects that are won in annual international competitions. The institute manages the „Basic Research of Socio-Economic Interest Programme -Ceres" of the National Plan for Research-Development and Innovation since 2001 and of the Module I -„R&D Complex Projects" in the fields of basic, nuclear physics and socio-economic researches of the Excellence Programme (CEEX). Institute of Atomic Physics is subordinated to the National Authority for Scientific Research (ANCS).

Patrimony

- Number of buildings: 1 (Tower Building)
- Allotment total area: 440 mp
- Building ground total area: 4840 mp

Fields of Activity

Management of European projects of basic and technological research in the field of plasma physics and nuclear fusion, and of basic research in the national programmes.

Main Research Directions

Research projects in the basic science, socio-economics and humanistic fields (Ceres and CEEX Programmes);

Projects of basic and technological research (Euratom Projects).

Organizational Structure

Management units: Euratom projects, Ceres Programme, CEEX Programme- Module I, socio-economics and humanistic fields, nuclear physics and basic sciences; Services

RESEARCH AND DEVELOPMENT PRODUCTS AND SERVICES

Certified Laboratories: 0

Services – Collaborations

International collaborations

There were accomplished in average 30-40 working stages per year, within the Mobility Plans approved and entirely supported by the European Commision, in the main Euratom partner institutions: Joint European Torus - Culham, UK (7 projects), Free University Brussels, Belgium (2 projects), Nuclear Research Centre-Mol, Belgium (2 projects), Research Centre for Nuclear Fusion - Cadarache, France (2 projects), Research Centre Karlsruhe, Germany (5 projects), Institute for Plasma Physics - Garching, Germany (2 projects), ENEA - Frascati, Italy (5 projects), KTH-Sweden (1 project), Institute for Plasma Physics, Prague, Chech Republic (1 project), CIEMAT-Madrid, Spain (4 projects), etc.

National and International Programs

Ceres Programme

A management unit accomplishes the management of the Ceres Programme of the National Plan of Research, Development and Innovation, based on the financial contract between the Institute of Atomic Physics and the Ministry of Education and Research. In the period 2001-2004, IAP organized annual competitions for project proposals and for priority projects, and signed a number of 682 financial contracts with the winners of the competitions.

During the successive execution phases of the projects the IAP has performed the scientific and economic monitoring of the

Human Resources

Total personnel	46
With academic training	33
Researchers	19
out of which	
Scientific researcher I	15
Scientific researcher II	2
Scientific researcher III	2
PhD.	16
Academy members	1

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intermediate, annual and final Reports. At present there are in execution 262 contracts.

CEEX Programme

Since the 2005 year the Institute of Atomic Physics accomplishes the management of the Module I, D8, D10 and D11 research fields of the Excellence Research Programme- CEEX, through a management unit similar to that of the Ceres Programme. There were signed 84 financial contracts with the winners of the competition organized by ANCS in 2005 and it was performed the the scientific and economic monitoring of the intermediate Reports

5th and 6th Framework Programs of the European Union

Romania participated at the 5th and 6th Framework Programmes of the European Union in the field of nuclear fusion (Euratom), since the first year in which access was given to the acceding countries, on the basis of the Contract of Association signed with the European Commission in 1999. The Institute of Atomic Physics, nominated in 2000 as the Research Unit for unitary coordination of the activities within the projects established on the basis of the Contract of Association with Euratom, assured this coordination through the complex project "Research, development and specialization in the field of nuclear energy (nuclear fusion)" in the frame of the Corint Programme, based on the contract between the IAP and the MEdC. The approved projects (in average 10-15 projects per year) are implemented on the basis of the financial contracts between IFA and the executive institutions: the National Institute for Laser, Plasma and Radiation Physics, Magurele, the "Horia Hulubei" National Institute for Physics and Nuclear Engineering, Magurele, the National Institute for Cryogenics and Isotope Technologies, Ramnicu Valcea, the University of Craiova, the Technical University of Cluj Napoca, the "Alexandru Ioan Cuza" University of Iasi. According to the Contract of Association, the responsibility for the execution quality of the projects and for their accomplished in due time rests upon the Institute of Atomic Physics.

The main achievements of the activities performed by the IAP and the executive institutions are:

Research & Development activity volume (RON)			
Year	**Budget financed activity**	**Income from other activity**	**Total activity**
2001	78 472.10	127 553.10	206 025.20
2002	88 669.30	252 038.80	340 708.10
2003	109 500.00	361 186.00	470 686.00
2004	123 000.00	631 441.50	754 441.50
2005	155 917.00	685 776.00	841 693.00
Income resources			
	From national contracts	**From international contracts** (Euro)	
2001	37 960.80	124 456	
2002	43 673.50	171 867	
2003	42 968.10	211 610	
2004	70 089.50	258 486	
2005	123 924.00	398 539	

- inclusion of the nuclear fusion researches performed in Romania in the European Research Area of Nuclear Fusion;
- access of the Romanian researchers at the most important fusion research centers and at the high performance fusion facilities in Europe;
- formation of researchers at the European level;
- increase of the competitive level of the Romanian scientific community in the field on nuclear fusion;
- integration of Romanian researchers in the scientific committee and subcommittee structures.

The Institute of Atomic Physics and the executive institutions are visited every year by personalities from the European Commission and from the Euratom Association partners. There are in operation the Memorandums of Understanding with Forshungzentrum Karlsruhe, Germany, and with ENEA-Frascati, Italy, signed in 2003, and 2004, respectively.

Participation to Consortia, Networks, Technological Platforms: 0

RESULTS OF RESEARCH-DEVELOPMENT ACTIVITY

Products, Technologies, Prototypes

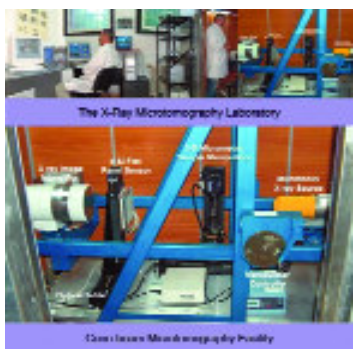
In the Euratom projects were achieved:

Products:

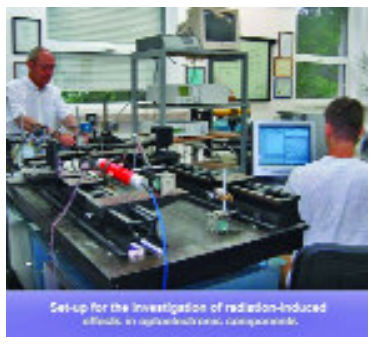
- catalysts for water detritiation systems

Facilities/Apparatus

- X-ray Microtomograph for non-destructive control of materials used in fusion facilities;



- Complex equipment for the evaluation of the irradiation effects on the optical and optoelectronic components



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Technologies:

- Technology for deposition of W layers on CFC tiles selected by Euratom for testing on the Joint European Torus (JET) of the solution for the ITER fusion reactor.
- Technology for performing the Be markers for the JET divertor wall.

Technological Transfer: 0

Patents: 0

Organization of National & International Scientific Events

- National Symposium “Ceres”, 2-3 December 2002, Bucharest
- The 1st “Days of Association Euratom /MEdC Meeting, 10-12 November 2004, Magurele
- The 2nd “Days of Association Euratom/MEdC Meeting, 27-28 October 2005, Iasi
- International Exhibition “ Fusion Expo” 5-15 October, Bucharest and 19-25 October, Iasi

Outstanding Results Obtained at Fairs & Exhibitions: 0

Infrastructure Units for Technological Transfer: 0

National and International Affiliations: 0

Success Stories: 0

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Publications

Papers published in ISI quoted journals 48
(out of which the most quoted)

1. *Stationary vortical flows în 2-dimensional plasma and planetary atmosphere,* Spineanu F., Vlad M., Physical Review Letters 94 (2005) 235003.
2. *Overview of ASDEX Upgrade results- development of integrated operating scenarios for ITER,* Günter S., Angioni C., Atanasiu C.V., et al., Nuclear Fusion, 10 (2005) 98
3. *Stationary vortical flows în 2-dimensional plasma and planetary atmosphere*, Spineanu F., Vlad M., Physical Review Letters 94 (2005) 235003.
4. *Larmor radius effects on impurity transport în turbulent plasmas*, Vlad M., Spineanu F., Plasma Physics and Controlled Fusion 47 (2005) 1015-1029.
5. *Turbulent transport of the ions with large Larmor radii*, Vlad M., Spineanu F., Itoh S. –I., Itoh K., Yagi M.,Plasma Physics and Controlled Fusion 47 (2005) 281-294.
6. *Statistical properties of an ensemble of vortices interacting with a turbulent field*, Spineanu F., Vlad M., Physics of Plasmas 12 (2005) 112303.
7. *Anisotropic electrostatic turbulence and zonal flow generation,* Balescu R., Petrisor I. and Negrea M., Plasma Phys. Controlled Fusion, 47, 2145 (2005).
8. *Stochastization as a possible cause of fast reconnectionin în the frequently interrupted regime of neoclassical modes,* O.Dumbrajs, V. Igorchine, D. Constantinescu**,** H. Zohm**,** Physics of Plasmas 12 (2005), 110704
9. *12, $1s^2 2pns(^1P^0)$ autoionizing levels în Be-like Al and C ions,* Stancalie, V, Physics of Plasmas 12, . 043301(2005)
10. *Complements to nonperturbative treatment of radiative damping effect în dielectronic recombination: Δn = 2 transition în C IV,* Stancalie, V. Physics of Plasmas *100705 (2005)*

Papers published in the main flux of publications 38
(out of which the most quoted)

1. *Analysis of deuteron elastic scattering on $^{6,7}Li$ up to 50 MeV,* Avrigeanu M, von Oertzen W., Fischer U., Avrigeanu V., Nucl. Phys. A759 (2005) 327.
2. *Radiated power and impurity concentrations în the Extrap-T2R reversed-field pinch,* Corre, Y., Rachlew, E., Cecconello, M., Gravestijn, R.M., Hedqvist, A., Pégourié, B., Schunke, B., and Stancalie, V. Physica Scripta 71(2005)523.
3. *Setup for the în situ monitoring of the irradiation-induced effects în optical fibers în the ultraviolet-visible optical range*, Sporea D. G., Sporea R., Rev. Sci. Instr. 76, (2005).
4. *YBCO films and CeO_2/YSZ/CeO_2 buffer layers grown on Ni-Cr-W RABiTS with a Pd seed layer,* Celentano G., Galuzzi V., Mancini A., Rufoloni A., Augieri A., Petrisor T., Ciontea L., Gambardella U., IEEE Transactions on Applied Superconductivity, 15 (2 PART II), (2005), 2691.
5. *Deposition and characterization of Y1-xCaxBa $2Cu_3O_{7-\delta}$ epitaxial thin films,* Cancellieri C., Augieri A., Boffa V., Celentano G., Ciontea L., Fabbri F., Galuzzi V., Petrisor T., Tebano R., IEEE Transactions on Applied Superconductivity 15 (2 PART III), (2005), 3038.
6. *Formation of nanostructureed Re-Cr-Ni diffusion barrier coatings on Nb superalloys by TVA method,* Lungu C. P., I. Mustata I, G. Musa G., Lungu A. M., Zaroschi V., Iwasaki K., Tanaka R., Matsumura Y., Iwanaga Y., Tanaka H, Oi T., Fujita K.: Surf and Coat. Techn, 200 (2005) 399
7. *Radiative Gaunt Factors*, Chelmus, A.R.D., Stancalie, V., Journal of Optoelectronics and Advanced Materials, 7(2005) 2405.
8. *$1s^2 2pns(^1P^0)$ autoionizing levels în Be-like Al and C ions* Stancalie, V. Physics of Plasmas 12, 043301(2005)
9. *Complex atoms modelling for plasma diagnostics,* Mihailescu, A., Stancalie, V. Journal of Optoelectronics and Advanced Materials 7(2005)2413.

Papers published in the proceedings of important international conferences 111
(we mention the most important ones in the field of nuclear fusion)

1. *Statistical properties of a turbulent plasma of vortices interacting with random waves,* Spineanu F., Vlad M., 32nd EPS Conference on Plasma Physics, Taragona, Spain, June 2005, *oral presentation*.
2. *Trajectory structures în turbulent plasmas,* Vlad M., Spineanu F., 32nd EPS Conference on Plasma Physics, Taragona, Spain, June, 2005.
3. *Atomic data for Zn-like W ion as related to the plasma modelling*, Mihailescu, A., Stancalie, V., Pais, V., Chelmus, A.R.D. 32nd EPS Conference on Plasma Physics, Taragona, Spain, June, 2005.
4. *An analytical model for resistive wall modes stabilization*, Atanasiu C.V., Miron I.G., 11th European Fusion Theory Conference, 26-28 September 2005, Aix-en-Provence, France.
5. *A background trend to ordered states în confined plasmas,* Spineanu F., Vlad M., 11th European Fusion Theory Conference, Aix en Provence, France, September 2005
6. *Test particles, test modes and self-consistent turbulence,* Vlad M., Spineanu F., 11th European Fusion Theory Conference, Aix en Provence, France, September 2005.
7. *Stochastic Modelling of Edge Plasma Turbulence*, Weyssow B., Steinbrecher G., 11-the European Fusion Theory Conference, 26-28 September 2005, Aix-en-Provence, France.
8. *Using Web Services for Remote Data Access and Distributed Applications*, Pais, V., Stancalie, V. 5th IAEA Technical Meeting on Control, Data Acquisition, and Remote Participation for Fusion Research, Budapest, Hungary, July 12 – 15, 2005.
9. *YBCO coted conductors on highly textured Pd-buffered Ni-W tape,* Celentano G., Galuzzi V., Mancini A., Rufoloni A., Vanozi A. Augieri A., Petrisor T., Ciontea L., Gambardella U., EUCAS'05, 7th European Conference on Applied Superconductivity, 11-15 Septembe r2005, Vienna, Austria.
10. *Sensitivity of activation cross sections of the Hafnium, Tantalum and Tungsten stable isotopes to nuclear reaction mechanisms, Workshop on Nuclear Data Needs for Generation IV Nuclear Energy Systems,* Avrigeanu V., Avrigeanu M., Roman F.L., Forrest R.A., Eichin R., Freiesleben H, Seidel K., Antwerpen 5-7 April 2005, P. Rullhusen (Ed.), World Scientific, Singapore.
11. *Hetero-junction Laser Diodes under Neutron Irradiation*, Sporea D, Vata I., Sporea R., 13th International Conference on Nuclear Engineering, Beijing, China, May, 2005.

Scientific books published in Romania 0

Scientific books published abroad 2

1. *Soliton self-modulation of the turbulence amplitude and plasma rotation,* Spineanu F., Vlad M., Progress în Soliton Research, Editor L. V. Chen, Nova Publisher, ISBN 1-59454-769-6 (2005)
2. *Processing of Selective Contours on Flat Surfaces by Computer Assisted Beam Tracking în Plasma Polymers and Related Materials*, G. Vlad, R. Ionita, I. Ciobanu, C. Petcu, G. Dinescu eds. M. Mutlu, G. Dinescu, R. Forch, J.M. Martin-Martinez, J. Vyskocil, ISBN 975-491-194-0, Hacettepe University Press, 2005, pp. 84-90

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