Association EURATOM - IPPLM

ANNUAL REPORT 2006

IPPLM
EURATOM

Warsaw 2007

Association EURATOM-IPPLM

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Warsaw
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ANNUAL REPORT 2006 of the

ASSOCIATION EURATOM-IPPLM

covers the period

1 January to 31 December 2006

Compiled by: A. Gałkowski and D. Błoniarz-Łuczak

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1 Introduction

The Polish Fusion programme constitutes a part of an European programme coordinated by EURATOM through Associations – including the Association Euratom/IPPLM. The programme is jointly funded by EURATOM and the Ministry for Science and Higher Education. The Association emphasizes co-operation efficiency of all relevant research groups located at Polish research institutes and universities, as well as that which is being carried out with other EURATOM Associations.

The Association contributes to a wide range of activities in the fusion programme, but its principal areas of expertise are those related to the following physics topics:

- Plasma theory and numerical plasma modelling
- Development of plasma diagnostics
- Fusion related materials design and engineering
- Electromagnetic and structural analysis
- PFCs erosion and re-deposition
- IFE "keep-in-touch" activity

New teams and allocated research tasks

Association Euratom/IPPLM is presenting the report on the second year of its operations. During that time the Association increased its membership by a number of new institutes and cooperating universities. Overall it has increased its composition by six units that is: Szczecin University of Technology, Maritime University of Szczecin, Opole University, Institute of Nuclear Physics (Polish Academy of Sciences) in Krakow, Institute of Atomic Energy and finally – Warsaw Agriculture University (socioeconomic studies). Such increase had invaluable impact on the scope of Association activities. The Association has undertaken subsequent tasks related to the priority project – W7-X Greifswald.
These tasks cover the following areas:

- Spectrometry of soft X-ray emission from W7-X stellarator by the use of fast counting semiconductor detectors
- Development and application of neutron diagnostics based on activation method
- C- O- monitor system
- Development of microwave diagnostic
- Structural analysis

They are also related to nonlinear dynamics of fast ion driven plasma modes approaching instability threshold (in collaboration with the Association Euratom-VR, Chalmers University of Technology, Göteborg).

Underlying Technology and Technology – New Subjects

Underlying Technology focused on development of new materials (W-Cu functionally graded composites) and plasma-wall interaction studies were conducted with relation to fuel and co-deposits removal. The tasks which were started last year have been carried on regarding the following subjects:

- Laser-induced removal of fuel and co-deposits from plasma facing components in tokamaks and of laser-irradiated surfaces characteristics
- W-Cu composites fabrication route based on powder metallurgy, high current electric impulse sintering, plasma spraying and electro crystallization methods

Recently allocated tasks are as follows:

- Application of hydrostatic extrusion application for particles and grains size refinement in materials relevant to the fusion technologies

- Modeling of thermo-mechanical behaviour of W-Cu functionally graded composites (FGCs) as a technological aspect of structure optimization

The task carried out by AGH UST has been completed in the following area:

- Post-analysis of the validation experiments for Ta cross sections up to 55 MeV in an IFMIF – like neutron spectrum

Another task has been carried on by PAS Institute of Low Temperature and Structure Research related to the area of:

- High temperature superconducting materials for fusion magnets. Measurements of the normal state properties of high temperature superconducting materials, evaluation of the consequences for fault conditions of the magnet (thermal conductivity, thermal expansion, normal state resistivity)

Recently allocated tasks relate to:

- In vacuum vessel dust measurement and removal techniques
  (Possible kind of measurements of dust produced during plasma transients)
  (IPPLM, Warsaw)
- Calculation pertaining to components activation and decay heat – waste classification
  (AGH, Krakow)
- Direct costs concerning nuclear treaties, agreements and agencies
  (IAE, Warsaw)
- Exploring common ways of understanding related to the fusion technology and its applications in power generation
  (Agriculture University, Warsaw)

EU Task Forces

The Association contributes to the ITM and PWI EU Task Forces. Dr J. Wołowski attended General EU PWI TF Meeting (Ljubljana, November 13-15) while Dr. R. Zagórski attended 14th European Fusion Physics Workshop (Aix-en-Provence, December 4-6).

JET

In 2006 the Association delegated its seven employees to take part in experimental campaigns C15-C17 running on JET (overall 63 pw in C15-C17, 32 pw in C18-C19). It is worth mentioning that the Association has eagerly joined the works on integration of transport and MHD codes at JET so well as those carried out by JET Task Force D.

Association Council and Steering Committee

On the national level we organized Association Council Meeting, for the first time represented by international composition. The Association Steering Committee Meeting took place on May 10th in Warsaw. As a partner within the European Fusion Research Programme, we welcomed a decision on the ITER site in Cadarache, France.

Andrzej Gałkowski
Head of Research Unit

1.1 General Information

Association EURATOM-IPPLM, Head of Research Unit

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Association Steering Committee

European Commission	Poland
Yvan Capouet Head, Unit J6, "Fusion Association Agreements", DG Research	**Jacek T. Gierliński** Director, Ministry of Education and Science
Barry Green Scientific Officer, Unit J6, "Fusion Association Agreements", DG Research	**Zygmunt Składanowski** Director, IPPLM
Jean – Jose Lopez Financial Officer, Unit J7, "Finance and Administration", DG Research	**Stanisław Szpilowski** Director, Polish National Atomic Energy

Figure 1.1 Research Unit in Poland

Research Unit in Poland

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Polish representatives in the European committees relevant to fusion research and development

Consultative Committee for the EURATOM Specific Research and Training Programme in the Field of Nuclear Energy (Fusion) – CCE-FU

Leszek Grabarczyk – Director, Ministry for Science and Higher Education
Andrzej Gałkowski – Head of Research Unit, IPPLM
Adam Sołtan – Director, Polish National Atomic Energy Agency

EFDA Steering Committee

Andrzej Gałkowski – IPPLM

Scientific and Technical Advisory Committee (STAC)

Ryszard Miklaszewski – IPPLM
Roman Zagórski – IPPLM

Administrative and Financial Advisory Committee

Stanisław Szpilowski – Polish National Atomic Energy Agency

Inertial Fusion Energy Coordinating Committee – Technical Group

Jerzy Wołowski – IPPLM

Industry Liaison Officer	Grzegorz Wojas – WUT
Public Information Officer	Ryszard Miklaszewski – IPPLM

EU Task Forces

Plasma-wall interaction	Jerzy Wołowski – IPPLM
Integrated tokamak modeling	Roman Zagórski – IPPLM

EFDA contact persons

QA	Łukasz Ciupiński – WUT
CEG-Fusion	Ryszard Miklaszewski – IPPLM

JET contact persons

ACP	Andrzej Gałkowski – IPPLM
SCP	Roman Zagórski – IPPLM
TFD	Marek Scholz – IPPLM
TFE	Roman Zagórski – IPPLM
TFT	Roman Zagórski – IPPLM
PR	Ryszard Miklaszewski – IPPLM
RP	Radosław Wawrzusiak – IPPLM

1.2 Financial Information

		Expenditure (Euro)
General Support		**1640128**
	Physics	1190023
	Inertial Confinement Fusion	148632
	Underlying Technology	301473
EFDA		**58540**
	Basic Support Technology	49959
	Preferential Support Technology	(1060)
	EFDA Art. 6. contracts	8581
Mobility		**72241**
TOTAL		**1770909**

Table 1.1 Expenditures for 2006

1.3 Statistics

The work programme of the Association EURATOM-IPPLM includes 21 R&D tasks on physics, underlying technology, technology and inertial confinement fusion. Table 1.2 contains information about tasks distribution.

	Physics	**Underlying Technology**	**Technology**	**Inertial Confinement Fusion**
IPPLM	5	1	-	3
SINS	2	-	-	-
WUT	2	3	-	-
IAE	-	-	-	-
ILTSR	-	-	1	-
AGH	-	-	1	-
OU	1	-	-	-
SUT	1	-	-	-
MUS	1	-	-	-
	12	4	2	3

Table 1.2 Tasks distribution for Association Euratom-IPPLM (2006)

Distribution of tasks by institution is also shown in the Figure 1.2.

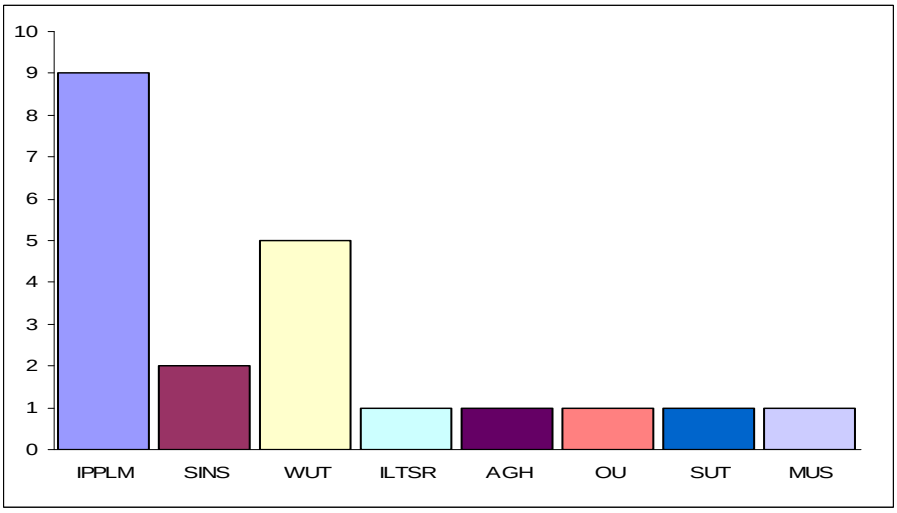

Figure 1.2 Number of tasks for year 2006 by institution

Manpower in 2006 is shown in the Table 1.3 below.

	professional	non professional	TOTAL
IPPLM	29	16	45
SINS	10	8	18
WUT	38	3	41
IEA	4	-	4
ILTSR	6	1	7
AGH	4	-	4
OU	4	-	4
SUT	5	-	5
MUS	3	-	3
	103	**28**	**131**

Table 1.3 Association EURATOM-IPPLM staff in 2006

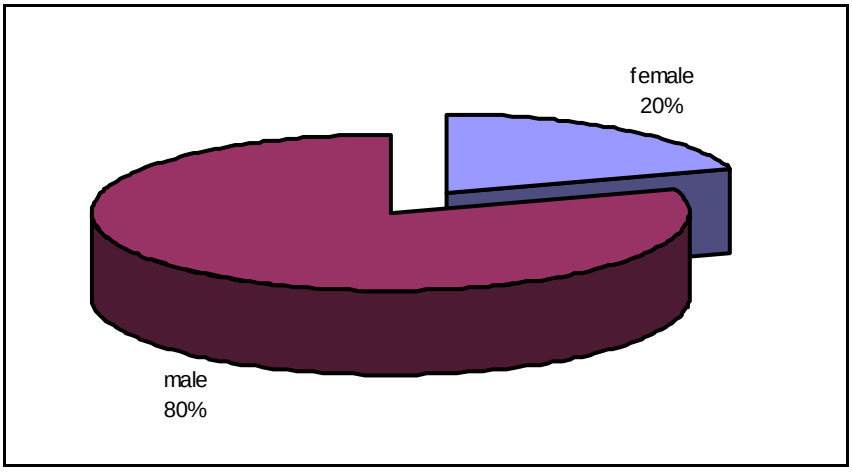

Figure 1.4 Association EURATOM-IPPLM staff in 2006 by gender

The following part of the Annual Report contains information of a preliminary and/or tentative nature and must not be quoted in publications nor listed in abstract journals. It is the executive summary of the full annual report, summarizing activities performed by the Association EURATOM-IPPLM in 2006. The full annual report is available on the CD attached to this document.