	EUROPEAN COMMISSION RESEARCH DG HUMAN RESOURCES AND MOBILITY	RTN Final Activity Report

Project No: 503369

Project Acronym: QUEST FOR UNIFICATION

Project Full Name: THE QUEST FOR UNIFICATION : THEORY CONFRONTS EXPERIMENT

Marie Curie Actions

RTN Final Activity Report

Period covered: from 01/10/2004 **to** 30/09/2008

Start date of project: 01/10/2004

Project coordinator name:

Project coordinator organisation name:
ECOLE POLYTECHNIQUE

Date of preparation: 05/12/2008

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Duration: 48

Version: 1

Marie Curie Actions

RTN Final Activity Report

GENERAL INFORMATION

Project No:	503369
Project acronym:	QUEST FOR UNIFICATION
Project full name:	THE QUEST FOR UNIFICATION : THEORY CONFRONTS EXPERIMENT
Period number:	1st
Period covered - start date:	01/10/2004
Period covered - end date:	30/09/2008
Project start date:	01/10/2004
Project duration [months]:	48
Project coordinator name:	
Project coordinator organisation name:	ECOLE POLYTECHNIQUE
Date of submission:	06/11/2008

SUMMARY OF THE RECRUITMENT DURING THE WHOLE PERIOD OF THE PROJECT

Contractor: ECOLE POLYTECHNIQUE

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Francesco Nitti	ER (4-10 years)	IT-Italy	No	Male	01/09/2005	31/08/2006	Full Time	12.0
Pablo Camara	ER (4-10 years)	ES-Spain	No	Male	01/09/2006	31/08/2008	Full Time	24.0
Arunansu Sil	ER (4-10 years)	IN-India	No	Male	01/10/2006	31/05/2007	Full Time	8.0
Panteleimon Tziveloglou	ESR (<4 years)	EL-Greece	Yes	Male	01/06/2008	30/09/2008	Full Time	4.0

Contractor: COMMISSARIAT A L'ENERGIE ATOMIQUE

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Arunansu Sil	ER (4-10 years)	IN-India	Yes	Male	01/06/2007	30/09/2008	Full Time	16.0

Contractor: RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITAET BONN

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Andrei Micu	ER (4-10 years)	RO-Romania	Yes	Male	01/10/2005	30/09/2008	Full Time	36.0

Contractor: ARISTOTLE UNIVERSITY OF THESSALONIKI

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Iain Peddie	ER (4-10 years)	UK-United Kingdom	No	Male	06/09/2005	05/09/2007	Full Time	24.0

Contractor: ISTITUTO NAZIONALE DI FISICA NUCLEARE

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Vyacheslav Rychkov	ER (4-10 years)	RU-Russian Federation	No	Male	01/09/2005	31/08/2007	Full Time	24.0
Olga Mena	ER (4-10 years)	ES-Spain	No	Female	15/09/2006	14/03/2008	Full Time	18.0
Claudian Hagedorn	ER (4-10 years)	DE-Germany	No	Female	01/02/2008	30/04/2008	Full Time	3.0

Contractor: SCUOLA INTERNAZIONALE SUPERIORE DI STUDI AVANZATI

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Nicolas Moeller	ER (4-10 years)	DE-Germany	No	Male	01/10/2005	30/09/2007	Full Time	24.0

Contractor: INSTITUTO SUPERIOR TECNICO

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Maria Tortola	ER (4-10 years)	ES-Spain	Yes	Female	01/02/2006	31/08/2008	Full Time	31.0

Contractor: UNIVERSIDAD AUTONOMA DE MADRID

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Stefan Antusch	ER (4-10 years)	DE-Germany	No	Male	01/09/2005	30/04/2007	Full Time	20.0
Filipe Joaquim	ER (4-10 years)	PT-Portugal	No	Male	01/09/2007	30/09/2008	Full Time	13.0
Achilleas Vamvasakis	ESR (<4 years)	EL-Greece	Yes	Male	01/04/2008	30/06/2008	Full Time	3.0

Contractor: UNIVERSITAT DE VALENCIA

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Satoru Kaneko	ER (4-10 years)	JP-Japan	No	Male	15/10/2006	30/09/2008	Full Time	23.5

Contractor: THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Gianmassimo Tasinato	ER (4-10 years)	IT-Italy	No	Male	01/09/2005	31/08/2007	Full Time	24.0
Andreas Athenodorou	ESR (<4 years)	CY-Cyprus	No	Male	01/10/2005	30/09/2008	Full Time	36.0

Contractor: UNIWERSYTET WARSZAWSKI

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Kin-ya Oda	ER (4-10 years)	JP-Japan	No	Male	01/10/2005	31/03/2006	Full Time	6.0
Oliver Eyton-Williams	ER (4-10 years)	UK-United Kingdom	No	Male	16/05/2006	15/11/2006	Full Time	6.0

Contractor: EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Cedric Delaunay	ESR (<4 years)	FR-France	No	Male	01/04/2007	30/06/2007	Full Time	3.0
Panteleimon Tziveloglou	ESR (<4 years)	EL-Greece	Yes	Male	01/01/2008	31/05/2008	Full Time	5.0

TOTAL PMM PER CONTRACTOR

Contractor: ECOLE POLYTECHNIQUE

No. of full-time equivalent months to be delivered according to the contract: 36

No. of full-time equivalent months covered by this recruitment during this reporting period
48.0

Contractor: COMMISSARIAT A L'ENERGIE ATOMIQUE

No. of full-time equivalent months to be delivered according to the contract: 24

No. of full-time equivalent months covered by this recruitment during this reporting period
16.0

Contractor: RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITAET BONN

No. of full-time equivalent months to be delivered according to the contract: 36

No. of full-time equivalent months covered by this recruitment during this reporting period
36.0

Contractor: ARISTOTLE UNIVERSITY OF THESSALONIKI

No. of full-time equivalent months to be delivered according to the contract: 24

No. of full-time equivalent months covered by this recruitment during this reporting period
24.0

Contractor: ISTITUTO NAZIONALE DI FISICA NUCLEARE

No. of full-time equivalent months to be delivered according to the contract: 48

No. of full-time equivalent months covered by this recruitment during this reporting period
45.0

Contractor: SCUOLA INTERNAZIONALE SUPERIORE DI STUDI AVANZATI

No. of full-time equivalent months to be delivered according to the contract: 24

No. of full-time equivalent months covered by this recruitment during this reporting period
24.0

Contractor: INSTITUTO SUPERIOR TECNICO
No. of full-time equivalent months to be delivered according to the contract: 24

No. of full-time equivalent months covered by this recruitment during this reporting period
31.0

Contractor: UNIVERSIDAD AUTONOMA DE MADRID
No. of full-time equivalent months to be delivered according to the contract: 36

No. of full-time equivalent months covered by this recruitment during this reporting period
36.0

Contractor: UNIVERSITAT DE VALENCIA
No. of full-time equivalent months to be delivered according to the contract: 24

No. of full-time equivalent months covered by this recruitment during this reporting period
23.5

Contractor: THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD
No. of full-time equivalent months to be delivered according to the contract: 60

No. of full-time equivalent months covered by this recruitment during this reporting period
60.0

Contractor: UNIWERSYTET WARSZAWSKI
No. of full-time equivalent months to be delivered according to the contract: 12

No. of full-time equivalent months covered by this recruitment during this reporting period
12.0

Contractor: EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
No. of full-time equivalent months to be delivered according to the contract: 0

No. of full-time equivalent months covered by this recruitment during this reporting period
8.0

TOTAL PMM FOR ALL CONTRACTORS

No. of full-time equivalent months to be delivered according to the contract	No. of full-time equivalent months covered by this recruitment during this reporting period
348.0	363.5

SUMMARY OF THE MAJOR PROJECT ACHIEVEMENTS OVER THE ENTIRE PERIOD

Describe what you would consider to be the most outstanding or more particularly significant outcome results of this project in terms of scientific/technological results, research training methodologies, opening up of career opportunities to researchers, international networking of the concerned scientific community, etc.

GENERAL PROGRESS AND COMPARISON WITH THE WORK PROGRAMME

According to the Work Plan, the research objectives of the network were:
(a) The origin of mass; quark, charged lepton and neutrino masses and mixing.
(b) Supersymmetric phenomenology.
(c) Particle astrophysics and cosmology.
(d) String phenomenology.
(e) Extra dimensions, Kaluza Klein phenomenology and gravity modifications.
(f) Dualities and non-perturbative effects.
The scientific highlights in the above six research topics are described in a separate document. It follows that the network made significant progress and achievements in all these objectives. In particular, as can seen from the publication list, the network has produced 491 joint publications (involved at least two different nodes) that have received already about 10000 citations.

The network research activity in the various nodes is summarized in Table 1 of the document with the tables, to be compared with the corresponding table of the Distribution of Tasks in the Work Programme. The differences are denoted by the symbol `star' (* where it was y in the Work Programme, and y* for a new entry). As it can be seen from the table, there was no essential difference in the distribution of tasks planned in the Work Programme. There have been though some small deviations, in connection to recent developments. Notice that there is only one entry with star, while there are several y*, implying that there were more nodes working in tasks that were not assigned initially. In particular, it appears that there was significant more research effort by several network nodes on supersymmetry and string phenomenology, as well as on dualities and theoretical issues (tasks b, d and f).

The main topics of activity where breakthroughs were obtained are (i) Higgs phenomenology, (ii) models of fermion masses and neutrino oscillations based on non-abelian discrete symmetries, (iii) supersymmetry phenomenology, (iv) split supersymmetry, (v) naturalness and electroweak precision tests, (vi) new approaches to the hierarchy problem (vii) methods of supersymmetry breaking mediation, (viii) methods for computing non-gaussianity in primordial fluctuations, (ix) dark matter candidates (x) moduli stabilization, supersymmetry breaking and string model building, (xi) low energy couplings from string instanton effects (xii) holographic description of QCD, (xiii) ultraviolet properties and possible finiteness of N=8 supergravity, (xiv) tachyon condensation.

The list of milestones were (their distribution within the six research objectives (a-f) is indicated in parenthesis):
Milestone 1: Higgs phenomenology (a, b, d, e).
Milestone 2: Study of models of flavor, describing quark and lepton masses and mixing (a, d).
Milestone 3: Study of CP violation in K and B physics in extensions of the Standard Model(a, b).
Milestone 4: Experimental tests of supersymmetry (b).
Milestone 5: Models of neutrino masses and mixing and prospects for neutrino long baseline and factory experiments (a).
Milestone 6: Supersymmetry breaking and mediation mechanisms (b, d, e).
Milestone 7: Comparison with observations of the predictions of inflationary models (b, c, d, e).
Milestone 8: Models of baryogenesis and leptogenesis (b, c, d, e).
Milestone 9: Brane cosmology (c, e).
Milestone 10: Brane construction of the Standard Model (d).
Milestone 11: Study of moduli stabilization from non-trivial fluxes (d, f).
Milestone 12: Systematic construction of unification models (b, d, e, f).
Milestone 13: Gravitational phenomena in brane constructions (d, e).
Milestone 14: Non-perturbative string dynamics and AdS/CFT correspondence (f).

The completion of the 14 Milestones, in comparison with the expected schedule, is described in Table 2 of the document with the tables. As seen from the table, there was a slide rearrangement during the last three years, as was pointed out at the Midterm Review.

There were several secondments of senior and young researchers from one node to another. Those funded by the network were about 500 and are displayed in Table 3 of the document with the tables. The numbers stand for different short visits with duration from a few days to a month and the arrow indicates the direction of the secondment. Important outreach activity was done in the greek and CERN nodes.

Scientific prices and awards:
- Gabriele Veneziano (CERN): University of Berne Albert Einstein Medal (2006)
- Giovanni Villadoro (Rome/INFN): "INFN Sergio Fubini Prize 2006" for the best Ph.D. theses in theoretical physics. His work, under the supervision of Fabio Zwirner, was part of the network activities.
- Sergio Ferrara (CERN): Danni Heinemann Prize of the American Physical Society for the discovery of Supergravity.
- Jose Valle (Valencia): Humboldt award.
- Gustavo C. Branco (Lisbon): Humboldt Fellowship (1/10/2005 to 28/2/2006).
- Two ERC grants were awarded to network members in the CERN node: a starting grant to G. Servant and an advanced grant to the network coordinator.

TRAINING

All vacancies were published in the Web (on the home page of the network, of the local institutes, and of CORDIS) and were announced to the main institutions active in our research field, world-wide. The announcements were sent to many institutions in Europe and to special mailing lists of senior people who sent suggestions for candidates. A large number of applications was received, varying between 50 and 100 per node with vacancy. The selection procedure was made locally and was based mainly on scientific excellency on the main research topics of the network.

The employment schedule was the following: Nine of the researchers started their employment early Fall 05: Francesco Nitti (ER in Ecole Polytechnique/Palaiseau from September 05), Iain Peddie (ER in Thessaloniki/Greece from September 05), Vyacheslav Rychkov (ER in Pisa/INFN from September 05), Stefan Antusch (ER in Madrid from September 05), Gianmassimo Tasinato (ER in Oxford from September 05), Andrei Micu (ER in Bonn from October 05), Nicolas Moeller (ER in SISSA/Trieste from October 05), Kin-ya Oda (ER in Warsaw from October 05), Andreas Athenodorou (ESR in Oxford from October 05). Two started in the middle of the academic year 05-06: Maria Tortola (ER in Lisbon from February 06) and Oliver Eyton-Williams (ER in Warsaw from May 06), while four more started in Fall 06: Pablo Camara (ER in Ecole Polytechnique from September 06), Arunansu Sil (ER Ecole Polytechnique for 8 months from October 06 and the rest 16 months in Saclay from June 07), Olga Mena (ER in INFN/Rome from October 06), Satoru Kaneko (ER in Valencia from October 06). Two more were hired later in the 3rd year of the contract: Filipe Joaquim (ER in Madrid from September 07, originated from Lisbon), and Cedric Delaunay (ESR at CERN for 3 months from April 07, originated from Saclay). Finally, three more were hired in the 4th year: Claudia Hagedorn (ER at INFN/Padova for 3 months from February 08, originated from Heidelberg), Panteimon Tziveloglou (ESR from January 08 for 9 months, the first 5 at CERN and the last 4 at Ecole Polytechnique, originated from Thessaloniki and PhD student at the university of Cornell/USA), and Achilleas Vamvasakis (ESR at Madrid for 3 months from April 08, originated from Thessaloniki). Thus, the network hired in total 20 young researchers: 16 ER and 4 ESR.

Two of them left already during the 2nd year of the contract: F. Nitti who was paid one year and then was moved on different funds but remains a member of the coordinating node, and K. Oda stayed only six months in Warsaw and then moved back to Japan in a longer term position. Six more terminated their appointment during the 3rd year of the contract: I. Peddie (after two years - he is now in a computer company), V. Rychkov (after two years - he has now a 3-years Assistant Professor position position in Scuola Normale of Pisa), N. Moeller (after two years - he has now a postdoctoral position in Munich), S. Antusch (after 20 months - he has now a 5-years junior faculty

position in T.U. Munich), G. Tasinato (after 2 years - he has now a postdoctoral position in Madrid), and O. Eyton-Williams (after 6 months - he is still in Warsaw but paid on different funds). Finally, one more left during the 4th year: O. Mena (after 18 months - she has now a long-term position in Barcelona). The remaining terminated their contract around the end of the 4th year: P. Camara (after two years - he remains in Ecole Polytechnique with a Marie Curie fellowship), A. Sil (after two years in total - he remains at Saclay on national funds), A. Micu (after 3 years - he goes back to Bucharest of his country of origin on a faculty job), M. Tortola (after 31 months - she has now a postdoctoral position in Hamburg), F. Joaquim (after 13 months - he has now a fellowship position at CERN), S. Kaneko (after 23.5 months - he has now a postdoctoral position in Lisbon), A. Athenodorou (after 3 years - he stays one more year in Oxford to finish his PhD thesis). Moreover the three researchers who were hired for 3 months (two ESR and one ER) went back to their home institutes: C. Delaunay to Saclay, A. Vamvasakis to Thessaloniki and C. Hagedorn to Heidelberg, while P. Tziveloglou is continuing his PHD thesis at CERN with a Marie Curie fellowship.

Compared to the initial planing, appart from minor modifications in the expected timing of the appointment contracts, there were the following modifications of the recruitment plan of the network that were described in the annual and mid-term reports:
(i) A slight redistribution of months between the two french nodes: A. Sil started his appointment in October 06 in Ecole Polytechnique for 8 months on fixed stipend and then was moved to Saclay for the remaining 16 months on an employment contract.
(ii) Because of the delay of the starting date of S. Kaneko, Valencia has provided 23.5 ER person months instead of 24 expected in the original plan.
(iii) Because of the early departure of S. Antusch by 4 months, the new ER F. Joaquim of Madrid node stayed 13 months (until the end of the contract), while an ESR have also been hired for 3 months: A. Vamvasakis from the Greek node.
(iv) O. Mena (ER in INFN node) terminated her appointment 6 months earlier, because she was offered a tenure track position in Barcelona, Spain. The INFN node has then hired another ER for 3 months: C. Hagedorn from Heidelberg, Germany. This leads 3 months less person months for the INFN node compared to the initial plan (45 person months, instead of 48).
(v) The contract of ER of Lisbon M. Tortola was extended by 7 months on fixed stipend, to 31 months (instead of 24 of the initial plan).
(vi) Apart from the above modifications, a leftover of funds was created from the marital status of the recruited researchers (single versus married as expected). It was then decided to extend the ER of Lisbon M. Tortola by 7 months on fixed stipend, to 31 months (instead of 24 of the initial plan). Furthermore, a few more doctorate students were exchanged among different nodes as ESRs (A. Vamvasakis mentioned above, C. Delaunay and P. Tziveloglou described below).
(vii) C. Delaunay from Saclay was hired as ESR for 3 months at CERN which had no person months to deliver in the initial contract. Moreover P. Tziveloglou from Greece was hired for 9 months (5 months at CERN and 4 months at Ecole Polytechnique/Palaiseau).
Thus, the network has provided 15 more person months ESR and 1/2 more ER, to a total of 363.5 (51 ESR + 312.5 ER), instead of 348 (36 ESR + 312 ER) of the initial plan, corresponding to an over-completion of 104%.

The majority of the selected ESR/ER's (13/20) were previously in institutes related to (other) network nodes, either as students or as postdocs (P. Camara in Madrid, A. Micu in Hamburg/Sussex, I. Peddie in Southampton, O. Mena in Madrid, M. Tortola in Valencia, S. Antusch in Southampton, K. Oda in Bonn, G. Tasinato in SISSA/Bonn, O. Eyton-Williams in Southampton, F. Joaquim in Lisbon, C. Delaunay in Saclay, A. Vamvasakis and P. Tziveloglou in Thessaloniki). On the other hand, four researchers originated from a country outside EU: V. Rychkov for 2 years (included in the 1st report), K. Oda for 6 months (2nd report), A. Sil for 2 years and S. Kaneko for 23.5 months (both in the 3rd report), corresponding in total to 53.5 months (15%).

The young researchers have been very well integrated into the research programme of the network. They had beneficial interactions with the other postdocs and students, and they participated actively in the scientific activity of their host institutes. Furthermore, they have been encouraged to travel and get contacts with other network nodes and establish collaborations. They also attended and presented their work to major network meetings, as well as to international conferences and workshops related to the network research activity. They enlarged considerably their expertise and acquired complementary skills: presentation skills, computer skills, and knowledge of the language of the host

country. Many of them were also in charge of research seminars organization and acquired organizational as well as teaching skills. All Career Development Plans were established on time and have been followed closely during the reporting year. Note that the big majority of ESR/ER who terminated their appointment remained in the network on different funds or on better positions (14/20): A. Nitti, V. Rychkov, G. Tasinato, O. Eyton-Williams, P. Camara, A. Sil, O. Mena, M. Tortola, F. Joaquim, S. Kaneko, A. Athenodorou, C. Delaunay, A. Vamvasakis and P. Tziveloglou, correponding to a fraction of 70%.

Following the Work Programme of the contract, training of young researchers had two components:
(a) Individual training through:
a1. Active participation in the joint research programme, that led in particular to 79 publications; 45 of them were joint, involving at least two different network nodes.
a2. Frequent exchanges among participating nodes and extended stays outside their home institutes.
a3. Special training measures of every host institute.
(b) Common training through:
b1. Active participation in the network meetings.
b2. Participation in European and other International Schools.

The ER and ESR mobility activity is summarized in a separate document (the duration of visits is usually one week, unless otherwise indicated). Details of training of A. Athenodorou (ESR in Oxford) and list of schools and other training events organized by the network, involving ESR and ER, are given also in a separate document. On the other hand, training of other young researchers of the participating institutes, graduate students and postdocs not employed by the network, has been very intense by systematic lectures, seminars, topical workshops, network schools and meetings. This allowed in particular an active collaboration between them and more senior members of the nodes. CERN played a special role in these training activities, and for establishing close connection and communication among the network members.

MANAGEMENT

The recruitment strategy of the network was very effective and successful both for ER and ESR. We received several hundreds of applications distributed equally between member (and associated) states of the EU and third countries from all over the world. The number of applications from women for ER was adequately large. Although decisions were based mainly on scientific criteria, gender issues and promotion of the exchange between nodes were taken into account. Three female scientists were hired as ERs during the 4 years of the contract: M. Tortola in Lisbon for 31 months, O. Mena in INFN/Rome for 18 months, and C. Hagedorn in INFN/Padova for 3 months. This gives in total 52 months, corresponding to a percentage of 14%.

The overall efficiency of the external communication was excellent, as well as in decisions making of the Network and the communication among the nodes of the network and the coordinating team. The network web site is well kept and regularly updated. During the four years of the contract, it received about 8500 hits. A special role in the management was played by the network meetings that are reported in a separate list. In addition to the scientific programme, there were regular administrative meetings of the steering committee to follow up the network activities and discuss organisation and management matters. Such meetings took place 8 times during the main network meetings (at CERN on 07.12.04, in Trieste on 25.05.05, in Corfu on 13.09.05, in Madrid on 12.12.05, in Paris on 31.05.06, in Pisa Mid-term Review meeting on 22-25.11.06, and in Barcelona on 22.05.08).

DISSEMINATION OF RESULTS OF THE PROJECT

Participation in conferences and other scientific events

Type of Event	Active participation			Passive participation
	Oral	Poster	Of which were invited presentations	
Conferences	509	3	509	229
Workshops	270	0	270	205
Other Scientific Meetings	132	0	132	109

Patents

Type of Patent	Application filed	Pending	Granted
National Patents - Member States and/or Associated States	0	0	0
National Patents - Third Countries - US	0	0	0
National Patents - Third Countries - Japan	0	0	0
National Patents - Third Countries - Other	0	0	0
European Patents (EP number)	0	0	0
International Patents (WO number)	0	0	0

Publications

Type of Publication	Total	Of which involved recruited researchers	Of which joint publications involving at least 2 network contractors	Of which invited
Peer Reviewed - Articles in Journals	1023	67	379	0
Peer Reviewed - Chapters in Books	5	0	0	0
Peer Reviewed - Articles in Conference Proceedings	207	10	60	207
Peer Reviewed - Books and Monographs	2	0	0	0
Non-Peer Reviewed	0	0	0	0
Submitted	140	2	52	0
Manuscripts in preparation	0	0	0	0

List of joint publications

see document attached

In the next table, Teaching and Transfer of Knowledge, in the item Other of Number of participants, only ER are counted. For a detailed description of the training events, see the documents `Lectures and Training Courses' and `Network meetings' attached

Teaching and Transfer of Knowledge

	Number of hours	Number of participants	
		Early stage researchers	Other
Lectures	110	1	0

	Number of hours	Number of participants	
		Early stage researchers	Other
Training Courses	73	2	7

Other outcomes

Type Of Other Outcomes	Number	Type
Academic qualifications	0	
Prizes and Awards	7	3 scientific prizes, 4 awards
Spin-off companies	0	

PUBLISHABLE BRIEF SUMMARY OF THE WORK PERFORMED AND OUTCOME OF THE PROJECT

This text should be as concise as possible and suitable for dissemination to non specialist audiences

The purpose of the network was to conduct research and provide excellent training to young researchers on both theoretical and phenomenological aspects on the physics of fundamental forces among elementary particles. The basic issues are: (i) to probe the physics of strong, electromagnetic and weak interactions beyond the current theory (Standard Model) which describes them accurately up to distances of the order of 10^-15 cm; (ii) to unify their quantum description together with the gravitational force. The directions of research are strongly motivated by the large amount of experimental data expected during the next years, and by the prospect of important progress in several areas of theoretical physics.

During the four years of the contract, the network produced 491 joint publications (involved at least two different nodes) that have received already about 10000 citations. The main topics of activity where breakthroughs were obtained are (i) Higgs phenomenology, (ii) models of fermion masses and neutrino oscillations based on non-abelian discrete symmetries, (iii) supersymmetry phenomenology, (iv) split supersymmetry, (v) naturalness and electroweak precision tests, (vi) new approaches to the hierarchy problem (vii) methods of supersymmetry breaking mediation, (viii) methods for computing non-gaussianity in primordial fluctuations, (ix) dark matter candidates (x) moduli stabilization, supersymmetry breaking and string model building, (xi) low energy couplings from string instanton effects (xii) holographic description of QCD, (xiii) ultraviolet properties and possible finiteness of N=8 supergravity, (xiv) tachyon condensation.

During the four years of the contract, the network employed 20 young researchers (16 ER and 4 ESR) and provided 363.5 person months (51 ESR + 312.5 ER), which represents an amount of 15 ESR + 1/2 ER months more than the initial plan. The majority of the selected ESR/ER's (13/20) were previously in institutes related to (other) network nodes, either as students or as postdocs, while a big fraction of those who terminate their appointment (14/20) remained in the network institutes on different funds or on better positions. Three female scientists were hired as ER for a total of 52 months, while four young researchers originated from a country "outside" EU (corresponding to 53.5 months). During the four years of the contract, there were 79 publications involving young researchers; 45 of them were joint involving at least two different network nodes. There were four regular network meetings, four more major meetings, as well as 46 additional "peripheral" ones organized and partly funded by the network.

List of Keywords

Theoretical particle physics; high energy physics; the origin of mass; quark, charged lepton and neutrino masses and mixing; supersymmetric phenomenology; particle astrophysics and cosmology; string phenomenology; extra dimensions; Kaluza Klein phenomenology; gravity modifications; dualities; non-perturbative effects.

Websites where additional information may be found

http://www.cpht.polytechnique.fr/rtn_aef/rtn2/rtn2.html

OVERALL ASSESSMENT OF THE ACHIEVEMENTS AND SUCCESS OF THE PROJECT

To what extent was the project successful in terms of:	
scientific co-operation and achievements	Very high
training and ToK	Very high
consolidation of the networking in the concerned scientific community	Very high

TRAINING/TRANSFER OF KNOWLEDGE/SKILLS

To what extent has the project resulted in transfer of knowledge and/or technology/training activities between academia and industry? (skip if not applicable)	Low

To what extent were the following the vehicle for the training and ToK activities?	
research collaboration	Very high
exchange of students/researchers (including secondments)	Very high
training given in experimental techniques	Low
participation in networking activities, lectures, seminars and talks	Very high
other	Very high

other, please specify:

The first question on industry does not apply to this network

Other refers to career perspectives of ESR/ER

To what extent were the recruited researchers actively involved in the	
planning of the research/training project?	Very high
management of the project?	High
planning of future research projects related to the results obtained?	Very high

Please comment:

MANAGEMENT/CO-ORDINATION

To what extent has the following contributed to facilitating the management of the project:	
interaction with Commission services	High
co-operation among contractors	Very high
contractual provisions	High

Attachments	LecturesFR.pdf, JointPubsFR.pdf, NetworkMeetingsFR.pdf, TablesFR.pdf, highlightsFR.pdf, YRactivityFR.pdf
Name	
Date	
Signature	