



EUROPEAN COMMISSION
RESEARCH DG HUMAN RESOURCES
AND MOBILITY

RTN Periodic Activity Report

Project No: 35863

Project Acronym: UniverseNet

Project Full Name: The origin of our universe: seeking links between
fundamental physics and cosmology

Marie Curie Actions

RTN Periodic Activity Report

Period covered: from 01/10/2008 to 30/09/2009

Date of preparation: 14/11/2009

Period number: 3rd

Start date of project: 01/10/2006

Date of submission (SESAM):
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Project coordinator name:
Prof. Subir Sarkar

Duration: 48

Project coordinator organisation name:
THE CHANCELLOR, MASTERS AND SCHOLARS
OF THE UNIVERSITY OF OXFORD

Version: 1

Marie Curie Actions

RTN Periodic Activity Report

GENERAL INFORMATION

Project No:	35863
Project acronym:	UniverseNet
Project full name:	The origin of our universe: seeking links between fundamental physics and cosmology
Period number:	3rd
Period covered - start date:	01/10/2008
Period covered - end date:	30/09/2009
Project start date:	01/10/2006
Project duration [months]:	48
Project coordinator name:	Prof. Subir Sarkar
Project coordinator organisation name:	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD
Date of submission:	14/11/2009

SUMMARY OF THE RECRUITMENT DURING THE REPORTING PERIOD

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 covered by this recruitment during this reporting period
		Country	LFR					
Arman Shafieloo	ER (4-10 years)	IR-Iran (Islamic Republic of)	No	Male	15/09/2008	14/09/2010	Full Time	12.0
Philip Mertsch	ESR (<4 years)	DE-Germany	No	Male	01/10/2007	30/09/2009	Full Time	12.0

Contractor: LANCASTER UNIVERSITY

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 covered by this recruitment during this reporting period
		Country	LFR					
Narendra Sahu	ER (4-10 years)	IN-India	No	Male	01/10/2007	30/09/2009	Full Time	12.0

Contractor: KING'S COLLEGE LONDON.

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 covered by this recruitment during this reporting period
		Country	LFR					
Anna Kostouki	ESR (<4 years)	EL-Greece	Yes	Female	01/11/2006	31/10/2009	Full Time	12.0

Contractor: INSTITUT DE FISICA D'ALTES ENERGIES

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 covered by this recruitment during this reporting period
		Country	LFR					
Thomas Konstandin	ER (4-10 years)	DE-Germany	No	Male	01/11/2007	31/10/2009	Full Time	12.0
Nikolaos Brouzakis	ESR (<4 years)	EL-Greece	Yes	Male	01/10/2008	30/09/2009	Full Time	12.0

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 covered by this recruitment during this reporting period
		Country	LFR					
Suchita Kulkarni	ESR (<4 years)	IN-India	No	Female	01/10/2007	31/03/2009	Full Time	6.0
Eun Kyung Park	ER (4-10 years)	KP-Korea (Democratic People's Republic of)	No	Female	01/10/2007	30/09/2009	Full Time	12.0

Contractor: LUDWIG-MAXIMILIANS-UNIVERSITAET MUENCHEN

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 covered by this recruitment during this reporting period
		Country	LFR					
Vittoria Demozzi	ESR (<4 years)	IT-Italy	No	Female	01/12/2008	31/05/2010	Full Time	10.0

Contractor: NORDISK INSTITUT FOR TEORETISK FYSIK

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 covered by this recruitment during this reporting period
		Country	LFR					

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 covered by this recruitment during this reporting period
		Country	LFR					
Jose Miguel No	ESR (<4 years)	ES-Spain	No	Male	01/04/2009	30/09/2009	Full Time	6.0

Contractor: HELSINGIN YLIOPISTO

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 covered by this recruitment during this reporting period
		Country	LFR					
Diana Battefeld	ESR (<4 years)	US-United States	No	Female	01/09/2007	31/08/2009	Full Time	11.0
Gerasimos Rigopoulos	ER (4-10 years)	EL-Greece	Yes	Male	01/10/2007	30/09/2009	Full Time	12.0

Contractor: UNIVERSITY OF IOANNINA.

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 covered by this recruitment during this reporting period
		Country	LFR					
Katarzyna Zuleta	ER (4-10 years)	PL-Poland	Yes	Female	01/10/2007	30/09/2009	Full Time	12.0
Juan Bueno Sanchez	ER (4-10 years)	ES-Spain	No	Male	08/01/2009	07/04/2010	Full Time	8.75

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 covered by this recruitment during this reporting period
		Country	LFR					
Andrzej Hryczuk	ESR (<4 years)	PL-Poland	Yes	Male	18/11/2008	30/09/2010	Full Time	10.5
Michael Gustafsson	ER (4-10 years)	SE-Sweden	No	Male	03/11/2008	30/09/2010	Full Time	11.0

Contractor: UNIVERSITE DE PARIS VII DENIS DIDEROT

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 covered by this recruitment during this reporting period
		Country	LFR					
Eugeny Babichev	ER (4-10 years)	RU-Russian Federation	Yes	Male	01/12/2007	30/11/2009	Full Time	12.0

Contractor: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)

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 covered by this recruitment during this reporting period
		Country	LFR					
Wessel Valkenburg	ESR (<4 years)	NL-Netherlands	No	Male	01/11/2006	31/10/2009	Full Time	12.0

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 covered by this recruitment during this reporting period
		Country	LFR					
Paul Hunt	ER (4-10 years)	UK-United Kingdom	No	Male	01/10/2007	31/10/2009	Full Time	12.0
Ioannis Ntalianis	ESR (<4 years)	EL-Greece	No	Male	01/10/2007	30/09/2010	Full Time	12.0

Contractor: SEOUL NATIONAL UNIVERSITY

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 covered by this recruitment during this reporting period
		Country	LFR					

Contractor: University of Copenhagen

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 covered by this recruitment during this reporting period
		Country	LFR					

TOTAL PMM PER CONTRACTOR

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

No. of full-time equivalent months to be delivered according to the contract: 24.0

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

Contractor: LANCASTER UNIVERSITY

No. of full-time equivalent months to be delivered according to the contract: 12.0

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

Contractor: KING'S COLLEGE LONDON.

No. of full-time equivalent months to be delivered according to the contract: 12.0

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

Contractor: INSTITUT DE FISICA D'ALTES ENERGIES

No. of full-time equivalent months to be delivered according to the contract: 24.0

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

Contractor: RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITAET BONN

No. of full-time equivalent months to be delivered according to the contract: 18.0

No. of full-time equivalent months covered by this recruitment during this reporting period
18.0

Contractor: LUDWIG-MAXIMILIANS-UNIVERSITAET MUENCHEN

No. of full-time equivalent months to be delivered according to the contract: 12.0

No. of full-time equivalent months covered by this recruitment during this reporting period
10.0

Contractor: NORDISK INSTITUT FOR TEORETISK FYSIK

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment during this reporting period
0.0

Contractor: EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

No. of full-time equivalent months to be delivered according to the contract: 6.0

No. of full-time equivalent months covered by this recruitment during this reporting period
6.0

Contractor: HELSINGIN YLIOPISTO

No. of full-time equivalent months to be delivered according to the contract: 18.0

No. of full-time equivalent months covered by this recruitment during this reporting period
23.0

Contractor: UNIVERSITY OF IOANNINA.

No. of full-time equivalent months to be delivered according to the contract: 24.0

No. of full-time equivalent months covered by this recruitment during this reporting period
20.75

Contractor: ISTITUTO NAZIONALE DI FISICA NUCLEARE

No. of full-time equivalent months to be delivered according to the contract: 24.0

No. of full-time equivalent months covered by this recruitment during this reporting period
21.5

Contractor: UNIVERSITE DE PARIS VII DENIS DIDEROT

No. of full-time equivalent months to be delivered according to the contract: 12.0

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

Contractor: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)

No. of full-time equivalent months to be delivered according to the contract: 12.0

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

Contractor: UNIWERSYTET WARSZAWSKI

No. of full-time equivalent months to be delivered according to the contract: 24.0

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

Contractor: SEOUL NATIONAL UNIVERSITY

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment during this reporting period
0.0

Contractor: University of Copenhagen

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment during this reporting period
0.0

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
222.0	219.25

SUMMARY OF THE EMPLOYMENT FORECAST FOR THE NEXT REPORTING PERIOD

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

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					
Arman Shafieloo	ER (4-10 years)	IR-Iran (Islamic Republic of)	No	Male	15/09/2008	14/09/2010	Full Time	11.5
Philip Mertsch	ESR (<4 years)	DE-Germany	No	Male	01/10/2007	30/09/2010	Full Time	12.0

Contractor: LANCASTER UNIVERSITY

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					

Contractor: KING'S COLLEGE LONDON.

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					

Contractor: INSTITUT DE FISICA D'ALTES ENERGIES

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					
Thomas Konstandin	ER (4-10 years)	DE-Germany	No	Male	01/11/2007	31/10/2009	Full Time	1.0
Nikolaos Brouzakis	ESR (<4 years)	EL-Greece	Yes	Male	01/10/2008	30/09/2010	Full Time	12.0
Michal Deak	ESR (<4 years)	SK-Slovakia	Yes	Male	01/10/2009	30/09/2010	Full Time	12.0

Contractor: RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITAET BONN

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					

Contractor: LUDWIG-MAXIMILIANS-UNIVERSITAET MUENCHEN

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					
Vittoria Demozzi	ESR (<4 years)	IT-Italy	No	Female	01/12/2008	31/05/2010	Full Time	8.0

Contractor: NORDISK INSTITUT FOR TEORETISK FYSIK

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					

Contractor: EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					

Contractor: HELSINGIN YLIOPISTO

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					

Contractor: UNIVERSITY OF IOANNINA.

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					
Juan Sanchez Bueno	ER (4-10 years)	ES-Spain	No	Male	08/01/2009	07/04/2010	Full Time	6.25

Contractor: ISTITUTO NAZIONALE DI FISICA NUCLEARE

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					
Michael Gustafsson	ER (4-10 years)	SE-Sweden	No	Male	03/11/2008	30/09/2010	Full Time	12.0
Andrzej Hryczuk	ESR (<4 years)	PL-Poland	Yes	Male	18/11/2008	30/09/2010	Full Time	12.0

Contractor: UNIVERSITE DE PARIS VII DENIS DIDEROT

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					
Eugeny Babichev	ER (4-10 years)	PL-Poland	Yes	Female	01/12/2007	30/11/2009	Full Time	2.0

Contractor: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					
Wessel Valkenburg	ESR (<4 years)	NL-Netherlands	No	Male	01/11/2006	31/10/2009	Full Time	1.0

Contractor: UNIWERSYTET WARSZAWSKI

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					
Ioannia Ntalianis	ESR (<4 years)	EL-Greece	Yes	Male	01/10/2007	30/09/2010	Full Time	12.0
Paul Hunt	ER (4-10 years)	UK-United Kingdom	No	Male	01/10/2007	31/10/2009	Full Time	1.0

Contractor: SEOUL NATIONAL UNIVERSITY

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					

Contractor: University of Copenhagen

Name of the Researcher	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months in the next reporting period
		Country	LFR					

TOTAL PMM PER CONTRACTOR

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

No. of full-time equivalent months to be delivered according to the contract: 24.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

23.5

Contractor: LANCASTER UNIVERSITY

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

0.0

Contractor: KING'S COLLEGE LONDON.

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

0.0

Contractor: INSTITUT DE FISICA D'ALTES ENERGIES

No. of full-time equivalent months to be delivered according to the contract: 12.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

25.0

Contractor: RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITAET BONN

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

0.0

Contractor: LUDWIG-MAXIMILIANS-UNIVERSITAET MUENCHEN

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

8.0

Contractor: NORDISK INSTITUT FOR TEORETISK FYSIK

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

0.0

Contractor: EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

No. of full-time equivalent months to be delivered according to the contract: 6.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

0.0

Contractor: HELSINGIN YLIOPISTO

No. of full-time equivalent months to be delivered according to the contract: 6.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

0.0

Contractor: UNIVERSITY OF IOANNINA.

No. of full-time equivalent months to be delivered according to the contract: 12.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

6.25

Contractor: ISTITUTO NAZIONALE DI FISICA NUCLEARE

No. of full-time equivalent months to be delivered according to the contract: 12.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

24.0

Contractor: UNIVERSITE DE PARIS VII DENIS DIDEROT

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

2.0

Contractor: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

1.0

Contractor: UNIWERSYTET WARSZAWSKI

No. of full-time equivalent months to be delivered according to the contract: 12.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

13.0

Contractor: SEOUL NATIONAL UNIVERSITY

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

0.0

Contractor: University of Copenhagen

No. of full-time equivalent months to be delivered according to the contract: 0.0

No. of full-time equivalent months covered by this recruitment for the next reporting period

0.0

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 for the next reporting period
84.0	102.75

PROJECT ACHIEVEMENTS DURING THE REPORTING PERIOD

Research Achievements

* Organisation of or participation in and presentations to external specialist workshops and conferences

UniverseNet members have been involved in organising and/or giving key talks at 88 workshops and conferences this year. Please see Appendix 1 (Conferences and Schools) for detailed information.

* Specialist exchange among Network Partners (number, nature, when, where, who)

There have been many such visits in 2008-09 for collaborative work (although not all were reported with dates etc). For details see Appendix 6 (visits and exchange).

* Individual and joint publications, directly related to the work undertaken within the contract (number, references)

During 2008-09 UniverseNet members have produced 313 relevant publications, 78 of which were inter-team collaborations. Bibliographic details (including author affiliations and citation data) are given in Appendix 2 (Publications).

* Development of new scientific collaborations (number, references)

UniverseNet is helping to promote and sustain a variety of scientific collaborations across European theoretical physics groups investigating the fundamental physics which shaped our Universe. Fig. 1 (Appendix 3) graphically illustrates the breadth of these collaborations which have resulted in 78 joint publications during 2008-09.

* Scientific awards and prizes obtained from the work directly related to the contract (number, details)

Herbi Dreiner (Bonn) won the "High Energy Particle Physics Outreach Award" of the European Physical Society in July 2009. Herbi, together with Michael Kortmann, was awarded the prize for the "Physik Show", which is run by university students for high school kids (and up).

Nikolaos Mavromatos received a Teaching Excellence Award - King's College London, Univ. of London, School of Physical Sciences and Engineering (May 2009).

C.Bonvin (Saclay) received for the work in her PhD thesis the "Swiss Physical Society Award 2009 for General Physics" (announced July 2009, to be presented in September 2009)

Slava Mukhanov (Munich) received the Tomalla prize 2009 given by Tomalla Foundation for Gravity Research (Switzerland) for "outstanding contribution to inflationary cosmology, especially for the determination of the spectrum of scalar fluctuations which have been confirmed so beautifully with the observations of the cosmic microwave background"

Celine Boehm (Annecy) received the "Medaille de bronze du CNRS" from the Centre National de la Recherche Scientifique, France on 30 April 2009, mainly for her work on dark matter.

Francesco Vissani (INFN, Gran Sasso) received the Occhialini Medal in February 2009 from the Italian Physics Society and Institute of Physics (IOP) for his important studies in the physics of neutrinos.

* Interest expressed in the Networks' dedicated Website

From 1 April 2007 to 13 August 2009 our website (<http://www.physics.ox.ac.uk/univnet/default.htm>) has had 7,379 unique visitors from around the world (see Fig. 2 and Fig. 3 in Appendix 3).

The website (<http://www-thphys.physics.ox.ac.uk/users/SubirSarkar/univnet.html>) which was set up initially has had 3,540 hits to date (2,543 unique visitors, 1,786 first time visitors returning).

* Visits of Senior Researchers from inside and/or outside the Network (number, name, place and

time of visit)

There were many visits of senior members of UniverseNet to other Teams in the network. In the third annual school in Barcelona we welcomed as lecturers Graham Ross (Oxford), Julien Lesgourgues (Annecy), Carlos Frenk (Durham), Marco Cirelli (Saclay), Pierre Binetruy (Paris VII), Serguey Petcov (INFN Trieste), Alejandro Ibarra (Munich), Sergio Pastor (Valencia), and Diego Torres (Barcelona).

There have been many such visits for collaborative work (although not all were reported with dates etc) for details of those that were reported during 2008-09 see Appendix 6 (visits and exchange).

* Contacts with relevant academic users groups (number, name)

Announcements of UniverseNet meetings, vacant positions etc. were circulated by the UK Cosmology network, the SLAC Library and the CERN Academic Service

* General progress with research activities programmed at individual, participant team and Network level

Overall the research activities proceeded according to plan - there were many papers written on the key objectives (dark matter, lepto/baryogenesis, inflation, string/M-theory cosmology, high energy cosmic rays & neutrinos), about 40% of which were inter-Team collaborations.

* Highlights on particularly innovative developments (novel concepts, approaches, methods)

The highlights of research carried out by UniverseNet during its 3rd year were discussed by the appointed Task Coordinators at the Network Meeting and are available on the web (<http://universenet.ifaes.es/>):

- 1) Origin of matter (Mariano Quiros)
- 2) Origin of dark matter (Manuel Drees)
- 3) Origin of cosmic rays (Gunter Sigl)
- 4) Origin of structure (David Lyth)
- 5) Origin of dark energy (Pierre Binetruy)
- 6) Origin of space-time (Soo-Jong Rey).

As is usual in this frontier field of physics, new techniques (both analytic and computational) were developed and used as required in response to the new challenges that arise.

* Citation index for individual and joint publications directly related to the work undertaken within the contract

The up-to-date citations received by each UniverseNet publication can be determined from the SLAC-SPIRES database to which the entries are linked on the webpage: http://www.physics.ox.ac.uk/universenet/universenet_publications.htm.

The papers were published in high impact factor international journals such as Astroparticle Physics, Journal of Cosmology and Astroparticle Physics, Journal of High Energy Physics, Nuclear Physics B, Physical Review D, Physical Review Letters, Physics Letters B, Science, etc)

* Expected scientific breakthroughs

Annecy

The recent observation by the PAMELA collaboration of a positron excess has triggered a lot of excitement in the astroparticle community. Although a nearby pulsar could be a plausible explanation, this excess could also be the first indirect hint of the presence of dark matter particles in the Milky Way halo. The Annecy team has refined the calculation of the antiproton flux with several widely cited articles in which they have examined the conventional spallation process as well as the annihilation of various dark matter

species. The PAMELA collaboration has recently published the best data on the antiproton-to-proton ratio up to 100 GeV and the Annecy team immediately responded by publishing a PRL article where they demonstrated that these observations point towards a purely astrophysical origin of the

antiprotons. This letter has been distinguished by a synopsis on the web site of the American Physical Society.

The Anney team has also been interested in the effect of dark matter clumpiness on the indirect signatures of WIMPs. They have clarified the notion of boost factor and applied their analysis to the putative dark matter spikes surrounding intermediate mass black holes or forming dark matter caustics. They have used the Via Lactea II simulation to show that the probability for a single nearby clump to be responsible alone for the positron anomaly is vanishingly small.

The Anney team is very interested in alternatives to the standard CDM/WIMPS paradigm. For instance, the team has updated constraints on scenarios where dark matter could consist of Peccei-Quinn axions produced through the misalignment angle mechanism.

Alternatively, dark matter could be warm (but this case is very constrained), or could behave as a mixture of cold and warm dark matter, even if there is a unique dark matter particle (besides ordinary active neutrinos). The team has produced an analysis of the parameter space of mixed cold-plus-warm models, given current data (in particular, Lyman-alpha data). These models could be motivated by keV sterile neutrino dark matter produced through a realistic mechanism leading to the phenomenology of mixed cold-plus-warm models. It was shown that such sterile neutrinos with a mass of 2 keV are well compatible with the data. This is a very surprising conclusion since earlier analyses, which assumed a more simplistic scenario for sterile neutrino production (not leading to a cold component), excluded masses below 20 keV.

ESR Wessel Valkenburg got interested in alternative explanations of the apparent universe acceleration, based on non-linear structure formation. He could show that a model proposed in the literature, the Swiss Cheese Universe " based on the assumption of several non-linear voids in the universe" does not work because it would alter the observed homogeneity of the CMB through the so-called Rees-Sciama effect.

Bonn

In two inter-node publications, Hans Peter Nilles and collaborators worked out new theories leading to axion-like particles as possible Dark Matter candidates, and relations to the Dark Energy. Manuel Drees, ESR Suchita Kulkarni and Mitsuru Kakizaki (Anney) developed a formalism that for the first time allows to estimate analytically the relic density of particles that were semi-relativistic when they decoupled. Hans Peter Nilles and collaborators found a mechanism to generate large hierarchies in supersymmetric theories; this could become an important ingredient for successful model building. Thomas Grimm and collaborators made progress in constructing Grand Unified gauge theories in the context of string theory. Ivone Zavala and her collaborator developed a new stringy scenario for inflation.

Helsinki

A gauge invariant path integral formulation of the quantum theory of Inflationary perturbations was achieved, consistently including gravitational perturbations. It will be highly relevant for studies of non-gaussianity and loop corrections for inflationary predictions. It is hoped that it can also be used to extend the standard stochastic picture of inflationary fluctuations to properly include gravitational fluctuations.

Munich

There was proposed a new type of inflation, vector inflation, and new type of dark energy, vector dark energy, which could be anisotropic. It was also shown that the primordial magnetic fields cannot be generated during inflation because of the strong back reaction effect.

Oxford

A paper (publication 251) co-authored by ER Arman Shafieloo has generated a ripple of interest in the cosmology community as reflected in an article in the New Scientist (11 April 2009). "Is dark energy getting weaker?" features the paper which examines a newly released catalogue of supernova explosions, including a number of relatively recent blasts nearby the new data made the best fit with a universe in which dark energy is losing strength.

ESR Phillip Mertsch co-authored with Subir Sarkar a proposal to test astrophysical versus exotic dark matter explanations of the PAMELA anomaly through measurements of the ratio of secondary-to-primary nuclei in cosmic rays. This was published in Physical Review Letters (publication 282).

Trieste

We analyse within the "flavoured" leptogenesis scenario of baryon asymmetry generation the interplay of the "low energy" CP-violation, originating from the PMNS neutrino mixing matrix U , and the "high energy" CP-violation which can be present in the matrix of neutrino Yukawa couplings, $\#$ and can manifest itself only in "high" energy scale processes.

A new method was proposed to test the dark matter interpretation of the positron excess observed by the PAMELA cosmic-ray detector, based on the identification of a high-latitude Galactic diffuse gamma-ray component associated to the dark-matter-induced prompt and radiative emission. This discriminates between the dark matter interpretation and astrophysical explanations proposed for the PAMELA excess. A novel approach to the problem of constructing mass models for the Milky Way was developed, concentrating on features regarding the dark matter halo component. The main result of this analysis is a novel determination of the local dark matter halo density which is found to be around 0.39 GeV cm^{-3} with a 1-sigma error bar of about 7%. This accurate determination of the local halo density is very important for interpreting direct dark matter detection experiments.

* Overall progress and possible problems encountered with individual work packages and/or Network-wide research activities

No problems encountered.

* Nature and justification for adjustments, if any, to the original research work plan

None made.

* Progress on cross interaction among disciplines represented within the Network

The three annual schools had leading experts lecturing on both particle physics and astrophysics/cosmology while the participants were approximately equally divided between the disciplines. This has generated plenty of cross interactions. Some collaborations have developed in the network between astrophysicists and particle physicists e.g. Sarkar (Oxford) with Boehm (Annecy).

* Access to/use of state-of-the-art infrastructure and facilities

Not applicable.

* Highlights on wider societal and/or ethical components of the project, such as public outreach activities

UniverseNet members have given many popular-level lectures to audiences of school children as well as the general public, and written several articles on new developments in the subject for both popular magazines and more specialised non-science journals. A particular highlight was "A Physics Show Performed by Students for Kids: From Mechanics to Elementary Particle Physics" (arXiv:physics/0701344) which has proved to be a huge success with the public. Every year a new 2 hour show is presented by 2nd year undergraduates at Bonn University under Prof Herbi Dreiner's guidance, with six performances in a full (550 seat) auditorium - the clips on YouTube have been viewed by over a million people.

Please see Appendix 4 (Outreach) for detailed information.

* Highlights on the scientific community recognition of the Network research contribution (awards,

invitation to conferences, ...)

UniverseNet members have been invited to present their research at numerous national and international conferences as keynote/plenary speakers. Many of them have also organised major conferences and/or served on the international advisory committees.

Please see Appendix 1 (Conferences and Schools) for detailed information.

Training and ToK

* The rate of recruitment of ESR and ER for each participant and for the Network as a whole (ratio person-months filled/offered)

Table 1 (Appendix 3) shows the breakdown of ESR-ER person-months of training already delivered and to be delivered in the coming years, plus sketches of the all researchers recruited so far by UniverseNet.

* The nature and justification for adjustments, if any, to the original overall number of person-months of ESR and ER as well as to the breakdown of this overall number among the participants (see table contained in Part C)

ER, Michael Gustafsson (INFN) was unable to start with UniverseNet until November 2008 which means he will complete a 23 month fellowship with UniverseNet before the end of the project, instead of the planned 24 months. The additional month was transferred to the Warsaw node to extend Paul Hunt's fellowship by 1 month.

* The time and duration of each individual appointment.

The time/duration of each individual appointment during the 1st, 2nd and 3rd years is given as months delivered/total duration of appointment:

1. Oxford, ESR Phillipp Mertsch (24/36)
2. Oxford, ER, Arman Shafieloo (12/24)
3. Lancaster, ER Narendra Sahu (24/24)
4. KCL, ESR Anna Kostouki (35/36)
5. IFAE, ESR Nikoloas Brouzakis (12/24)
6. IFAE, Barcelona, ER Thomas Konstandin (23/24)
7. Bonn, ESR Suchita Kulkarni (18/18)
8. Bonn, ER Eun Kyung Park (24/24)
9. Munchen, ESR Vittoria Demozzi (10/18)
10. CERN, ESR Lotta Mether (4/4)
11. CERN, ESR Nicholas Harries (4/4)
12. CERN, ESR Charalampos Bogdanos (4/4)
13. CERN, ESR Jose Miguel (6/6)
14. Helsinki, ESR Diana Battefeld (24/24)
15. Helsinki, ER Gerasimos Rigopoulos (24/24)
16. Ioannina, ER Nicolas Chatillon (9/9)
17. Ioannina ER Juan Bueno Sanchez (9/15)
18. Ioannina, ER Katarzyna Zuleta (24/24)
19. INFN, ESR Andrzej Hryczuk (10.5/22.5)
20. INFN, ER Michael Gustafsson (11/23)
21. Paris VII, ER Eugeny Babichev (22/24)
22. Annecy, ESR Wessel Valkenburg (35/36)
23. Warsaw, ER Paul Hunt (24/25)
24. Warsaw, ESR Ioannis Ntalianis (24/36)
25. Copenhagen, ER Hael Collins (12/12)
26. INFN ESR - ESR to be appointed (0/7.5)
27. INFN ESR - ESR to be appointed (0/6)
28. IFAE, Madrid - ESR Michal Deak (0/12)

29. CERN - ESR to be appointed (0/6)

* the number, names and level of involvement of senior researchers directly associated with the tutoring/supervision of the recruited ESR or ER, at each participant

Each ESR and ER has a local Supervisor as well as a "Mentor" (a senior person in another Team of the Network who they can turn to for independent help and advice)

1. Oxford, ESR: Phillipp Mertsch
(Supervisor: Subir Sarkar; Mentor: Herbi Dreiner)
2. Oxford ER: Arman Shafieloo
(Supervisor: Subir Sarkar; Mentor: Leandros Perivolaropoulos)
3. Lancaster, ER :Narendra Sahu
(Supervisor: John McDonald; Mentor: Serguey Petcov)
4. KCL, ESR: Anna Kostouki
(Supervisor: Nick Mavromatos; Mentor: Smaragda Lola)
5. IFAE, ESR: Nikolaos Brouzakis
(Supervisor: Mariano Quiros ; Mentor:Nikolaos Tetradis)
6. IFAE, Barcelona, ER: Thomas Konstandin
(Supervisor: Mariano Quiros; Mentor: Christophe Grojean)
7. Bonn, ESR: Suchita Kulkarni
(Supervisor: Manuel Drees; Mentor: Sacha Davidson)
8. Bonn, ER: Eun Kyung Park
(Supervisor: Manuel Drees; Mentor: Celine Boehm)
9. Munchen, ESR: Vittoria Demozzi
(Supervisor:Slava Mukhanov ; Mentor: Toni Riotto - ask if he agrees)
10. CERN, ESR: Lotta Mether
(Supervisor: Ignatios Antoniadis; home Supervisor: Kari Enqvist)
11. CERN, ESR: Nicholas Harries
(Supervisor: John Ellis; home Supervisor: Graham Ross)
12. CERN, ESR: Charalampos Bogdanos
(Supervisor: Antonio Riotto; home Supervisor: Kyriakos Tamvakis)
13. CERN, ESR: Jose Miguel No
(Supervisor: Christophe Grojean; home Supervisor: Mariano Quiros)
14. Helsinki, ESR: Diana Battefeld
(Supervisor: Kari Enqvist; Mentor: Mairi Sakellariadou)
15. Helsinki, ER: Gerasimos Rigopoulos
(Supervisor: Kari Enqvist; Mentor: Konstantinos Dimopoulos)
16. Ioannina, ER: Nicolas Chatillon
(Supervisor: Kyriakos Tamvakis; Mentor: David Langlois)
17. Ioannina, ER: Juan Bueno Sanchez
(Supervisor: Kyriakos Tamvakis; Mentor: David Lyth)
18. Ioannina, ER: Katarzyna Zuleta
(Supervisor: Kyriakos Tamvakis; Mentor: Ruth Gregory)
19. INFN, ESR: Andrzej Hryczuk
(Supervisor: Serguey Petcov; Mentor: Marco Cirelli)
20. INFN, ER: Michael Gutafsson
(Supervisor: Antonio Masiero; Mentor: Pierre Ullio)
21. Paris VII, ER: Eugeny Babichev
(Supervisor: Pierre Binetruy; Mentor: Krzysztof Meissner)
22. Annecy, ESR: Wessel Valkenburg
(Supervisor: Julien Lesgourgues; Mentor: Steen Hannestad)
23. Warsaw, ER: Paul Hunt
(Supervisor: Zygmunt Lalak; Mentor: Graham Ross)
24. Warsaw, ESR: Ioannis Ntalianis
(Supervisor: Zygmunt Lalak, Mentor: Anupam Majumdar)
25. Copenhagen, ER: Hael Collins

(Supervisor: Anupam Majumdar; Mentor: Denis Comelli)
28. IFAE, Madrid - ESR Michal Deak
(Supervisor: Jesus Moreno ;Mentor:Subir Sarkar)

* The number of ESR that are expected to present their PhD thesis and when

Diana Battefeld (Helsinki) defended her thesis titled: Non Gaussianities and Preheating from Inflation and Magnetogenesis from rotating cosmic string loops on August 5th 2008

Nicholas Harries (Oxford) will have his thesis viva in September 2008

Wessel Walkenburg (LAPTH, Annecy) defended his PhD thesis titled "Confronting models with cosmic perturbations: cosmological perturbations in earliest and latest stages" on 6th July 2009.

Anna Kostouki (KCL) expects to present her PhD thesis during the next academic year, 2009-2010.

Ioannis Dalianis (Warsaw) expects to present his PhD thesis by the end of 2010. The title will probably be "Cosmological aspects of Supersymmetry breaking".

Nikolaos Brouzakis defended his thesis in October 2008 at the University of Athens.

* The number and place of the short visits and secondments undertaken by each individual ESR or ER either within or outside of the Network

See Appendix 5 (activities of ER and ESR) for full details

* Number of visits of the ESR and ER to their home scientific community

See Appendix 5 (activities of ER and ESR) for full details

* Attendance at Network meetings by the ESR and ER (number, names, place, date)

17 ESR and ER attended the 3rd annual UniverseNet School/Meeting held in Spain, 28 September - 3 October 2009 and most of them gave talks on their research (all available on: <http://universenet.ifaes.es/>).

During the Network annual meeting on 3 October, the new ESR and ER present gave brief presentations about their research background (available at: <http://universenet.ifaes.es/>).

* Participation in and presentations to workshops and conferences by ESR and ER (number, names, place, date)

See Appendix 5 (activities of ER and ESR) for full details

* Organisation of training events (e.g. schools, training workshop/seminar, hands-on training session on specialised instrument/techniques) at individual participant sites (number, attendees' names, place, date)

See Appendix 5 (activities of ER and ESR) for full details

* Organisation of Network-wide training events (number, attendees' names, place, date)

The annual network school training school was held in Barcelona (Spain) 28 Sep - 2 Oct 2009, and attracted 136 registered participants about 41 of whom were from outside the network. There were pedagogical lectures every morning by invited experts (Ross, Lesgourgues, Frenk, Cirelli, Binetruy, Petcov, Ibarra, Pastor and Torres). The lectures covered contemporary issues in both astrophysical cosmology and particle cosmology and time was provided for questions and discussion after each lecture. In the afternoons there were short talks by young researchers - the number of talks offered exceeded the number of available slots so priority had to be given to network members (especially

our ERs and ESRs). Those who could not be offered a speaking slot were invited to contribute a poster (and made a brief oral presentation in the poster inauguration session on the opening day). There was plenty of time available (in the program breaks) for interactions among participants and several new collaborations have begun as a result. Full details (including downloadable versions of all lectures and talks given, attendees' names etc) are available on: <http://universenet.ifaef.es/>

* Number, place, purpose of any meeting (e.g. workshop) organised by the ESR or ER themselves

See Appendix 5 (activities of ER and ESR) for full details

* General progress with training and ToK activities programmed at individual, participant team and Network level (type of guidance, supervision, coaching or Mentoring in place to support ESR and ER)

Each ESR/ER benefits from the training programme of the host institution (advanced lectures, seminars, colloquia etc) plus interactions with other members of their Team, in addition to the individual guidance provided by their Supervisors. They are also each assigned a Mentor (in a different Team) who keeps track of their progress and advises on professional development - appropriate Mentors are selected by the Co-ordinator in consultation with the Supervisors.

* Highlights on the development of particularly innovative approaches to training and ToK (e.g. specific training packages of Network-wide relevance)

The annual school has lectures by both astrophysical and particle cosmologists, thus enabling the students (who are roughly equally divided between the two categories) to appreciate the difference in perspective towards common problems in cosmology and the joint efforts being made by the two sides to arrive at satisfactory solutions.

* Highlights on the exploitation of the "complementarities" between Network participants with respect to training and ToK

Although the network involves mainly theorists, some of them are also involved with experiments (e.g. Oxford participates in the Pierre Auger Observatory and IceCube). Similarly although most of the participants have a background in particle physics, there are also several astronomers/cosmologists involved. These complementarities are fully exploited in the annual training school which provides training in diverse subjects ranging from quantum field theory to interpretation of cosmological observations, and covers topics in both particle cosmology (theoretical issues concerning inflation, baryo/leptogenesis, dark energy etc) and astroparticle physics (experimental issues concerning dark matter, high energy cosmic rays, gamma-rays, neutrinos etc).

* Nature and justification for adjustments, if any, to the original training/ToK (e.g. opportunities for new collaborations regarding training activities)

None

* Career development plans as elaborated by the ESR and ER involved in the project

These have been provided already for each ESR/ER.

* Career development opportunities/prospects for ESR and ER involved in the project

All ESR/ER are encouraged to participate fully in the activities of the host department, especially in the organisation of seminars, journal clubs and conferences/workshops, in interacting with visitors and in outreach activities. ERs in particular can also be involved in supervising/evaluating undergraduate research projects and graduate teaching/problems classes. This varies from Team to Team as the nature of the host institutions is quite diverse, from specialised research laboratories to large universities - each provides specific opportunities for acquiring complementary skills. For example at CERN, the ESR are able to attend the renowned Academic Training Programme, learn French, advanced computing techniques etc, while at Oxford University, both the ESR/ER can

engage with the extensive academic activities of their host College in addition to those at the Department and at the University's Learning Institute.

* achievements regarding the acquisition of complementary skills such as communication, language skills, computer skills, project management, ethics, team building, etc.

Our ESR/ER are all engaged with diverse activities as outlined above. Some of the activities reported in 2008/09 included: Anna Kostouki (KCL) followed an "evening language class" in French and attended a one day "Publishing Workshop", in June 2009. Thomas Konstandin (Barcelona) has acquired basic conversation and writing/reading skills in Spanish. Andrzej Hryczuk has gained a basic knowledge of Italian language. Katarzyna Zuleta studied a 1 year course of Greek at the International Centre of Hellenic Education-Culture & Vocational Training "Stavros S. Niarchos" (Ioannina U.). Ioannis Dalianis attended a Polish language course. Nikolaos Brouzakis attended a language course in Spanish from March 2009 to May 2009 at the Language School of the Universitat Autònoma de Barcelona and was awarded a title for the level A1 of the EC language apprentice scale. Wessel Valkenburg has acquired a considerable experience in programming in the Fortran-90 language.

* achievements regarding the training/ToK on specialised instruments/equipment

Not applicable

* level of satisfaction of the trainees (e.g. as expressed in response to questionnaires)

No questionnaires circulated so far (but no complaints received either)

Management

* effectiveness of the "internal" communication and decision making between the co-ordinator, team leaders, Supervisors, down to the ESR and ER, including feedback processes

Communication between the Co-ordinator and Team leaders was mainly through email and telephone. The annual network meetings have provided an appropriate forum for open discussion both formally and informally between them as well as with other network members, in particular the ESR and ER. If any problem arose with any of the appointed the ESR/ER, the appointed "Mentor" (in a different Team) was contacted to resolve the issues with the Supervisor/Team leader and the Co-ordinator. This system worked well on the rare occasion that a problem did arise.

* effectiveness of the communication between the Network and the Commission Services (frequency, efficiency, timely feedback), particularly regarding the conformance with contractual provisions and the implementation of contingency plans where needed

This was quite satisfactory since the Co-ordinator maintained close contact (through the Administrator) with the Scientific Officer-in-charge, who provided advice and guidance when requested.

* Network self-assessment through benchmarking activities (exchange of best practices among participants and/or development of ad hoc performance indicators regarding cost management, staff selection, measurement of research/training/ToK outputs, young researchers' involvement, etc.)

This was done at the meeting of the Scientists-in-Charge at the annual school/meeting in 2007, the mid-term review meeting in 2008 and annual school/meeting in 2009.

* overall quality and efficiency of the "external" communication strategy of the Network (CORDIS; personal, team & Network web sites updates; newsletters)

The network website was constantly kept up-to-date with all relevant information by the Administrator. She posted all the ESR/ER vacancies on CORDIS, compiled and maintained mailing

lists, provided help and advice to the ESR/ER and also produced periodic newsletters (downloadable from: <http://www.physics.ox.ac.uk/univnet/default.htm>) which were circulated to all UniverseNet members.

* Effectiveness of the recruitment strategy of the Network in terms of equal opportunities (including gender balance) and open competition at international level

All UniverseNet positions were widely advertised on popular websites for professionals (e.g. SPIRES and CERN job announcements) as well as on CORDIS, and circulated by email to cosmologists and astroparticle physicists worldwide. Applications from women were particularly encouraged. The effectiveness can be judged from the fact that typically 20-30 applications from well-qualified candidates were received for each position advertised. Moreover 8 of the 26 ESR/ER appointed so far are women, well above the average for this field. The selection process was transparent in that the application materials of all the short-listed applicants, along with the deliberations of the selection committee in each Team, were made available to the other Team leaders on the restricted access webpage. Since the same candidates had sometimes applied to different teams, this also enabled appointments to be made optimally according to local needs and interests by sharing information.

DEVIATIONS/MODIFICATIONS TO THE ORIGINAL WORK PROGRAMME

Please indicate if the project

a) is, at this stage, being implemented as originally planned

If you answered b) or c) please include a detailed description of the modifications in the report (one page)

ADDITIONAL INFORMATION

Please indicate any additional information, which may be considered useful to assess the work done during the reporting period.

Attachments	appendix6_visits_3rdyear.doc, appendix5_participation_esr_er.doc, appendix3_figures&tables_3rdyearv2.doc, appendix4_Outreach_3rdyearv4.doc, appendix2_publicationsv4.doc, appendix1_ConferencesSchool_3rdyearv4.doc
Name	
Date	
Signature	