



Marie Curie Actions

Human resources



and mobility



UniverseNet

Origin of the Universe: Seeking links between fundamental physics & cosmology

Coordinator's annual report
(1 Oct 2006 - 30 Sep 2007)

Subir Sarkar



Contract MRTN-CT-2006-035863

<http://www.physics.ox.ac.uk/universenet/>

38 institutions organised in 14 European (+ 1 Korean) national teams



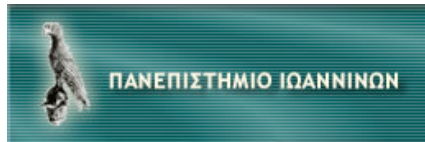
John McDonald



Subir Sarkar



Nick Mavromatos



Kyriakos Tamvakis



John Ellis



Mariano Quiros



Antonio Masiero

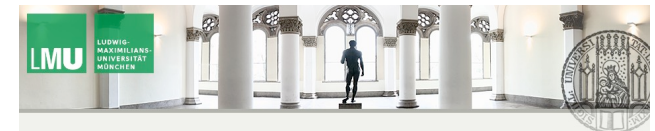


Julien Lesgourgues

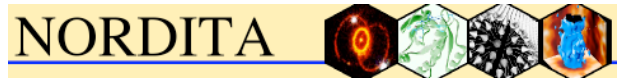


Université Paris 7 - Denis-Diderot

Pierre Binetruy



Slava Mukhanov



Anupam Mazumdar



Kari Enqvist



Manuel Drees

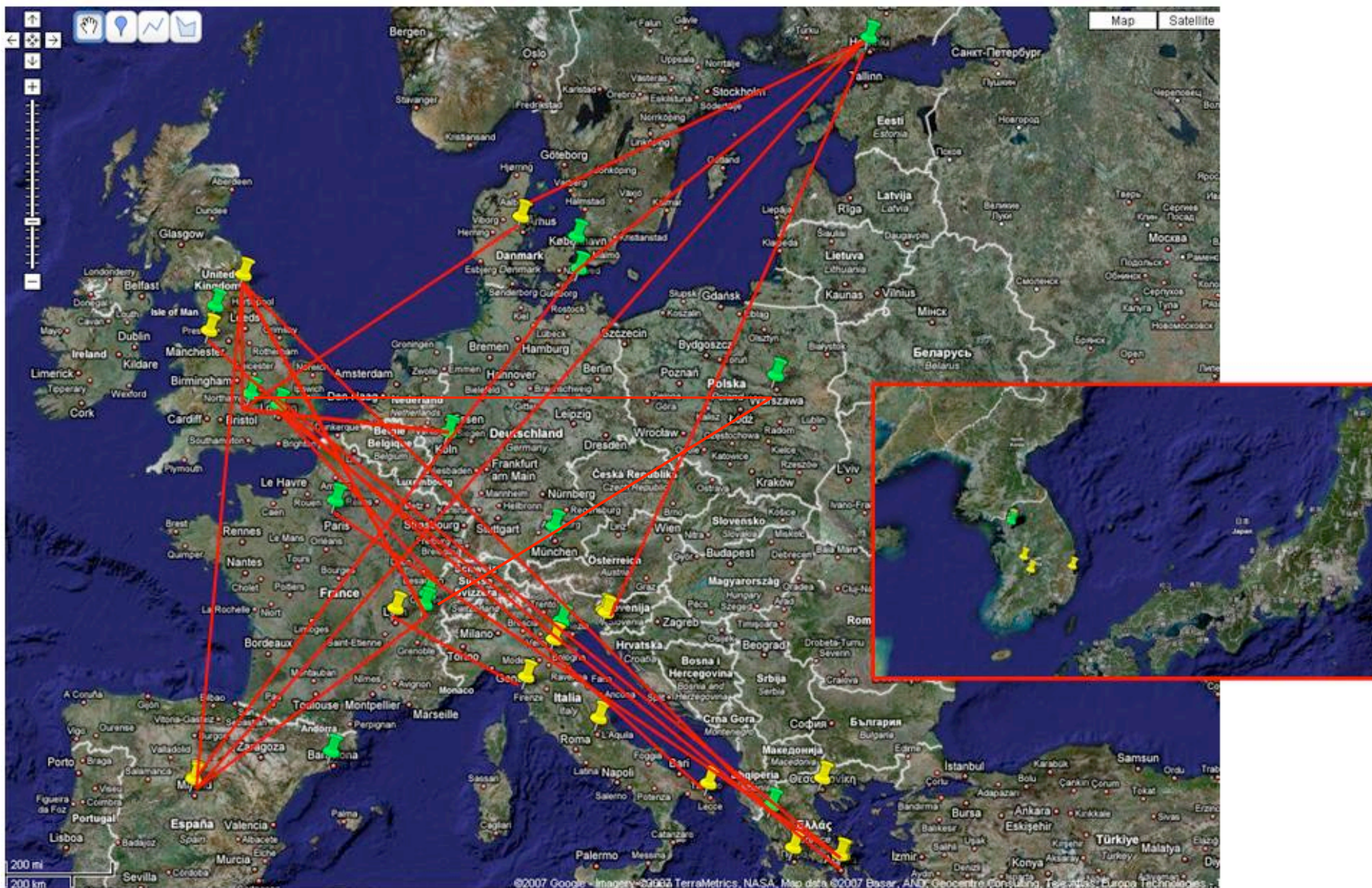


Zygmunt Lalak

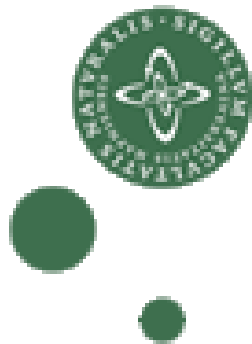


Jihn Kim

Collaboration - MAP



NORDITA has moved to Stockholm so the Copenhagen node is now the Niels Bohr Institute (including the DARK Centre) - the new Contract has just been drawn up and is being ratified by Brussels





UniverseNet

**The origin of our universe:
Seeking links between fundamental physics and cosmology**

This network brings together the major European theoretical physics groups investigating the fundamental physics which shaped our Universe. They have made important contributions across the whole spectrum of research in particle cosmology and astroparticle physics, from phenomenological issues concerning the genesis of matter and radiation, dark matter and dark energy, to fundamental questions about the nature of space-time and of the Big Bang itself. This is an opportune time for such studies, given both the explosion of observational results on the cosmological and astrophysical front, as well as the key tests of theories of new physics beyond the Standard Model which will be performed in forthcoming experiments within the lifetime of the network.

The key research tasks are to investigate:

- 1) the origin of baryons
- 2) the origin of dark matter
- 3) the origin of cosmic radiation
- 4) the origin of cosmic structure
- 5) the origin of dark energy
- 6) the origin of space-time

Mytilene Island of Lesbos, Greece



Fourth Aegean Summer School Black Holes

17 - 22 September 2007

Lecturers

S. Carlip
C. Charmousis
R. Gregory
P. Kanti
H. Kodama
K. Kokkotas
S. Mathur
G. Neugebauer
N. Obers
S. Seahra
G. Siopsis
U. Sperhake

First Annual School of the EU Network "UniverseNet" The Origin of the Universe

24 - 29 September 2007

Lecturers

A. Challinor
E. Copeland
J. Knapp
D. Langlois
J. Peacock
F. Quevedo
S. Pokorski
A. Riotto
A. Strumia
S. Trivedi
P. Ullio

The Aegean Summer School is organized by the Physics Department of the National Technical University of Athens and sponsored by: Physics Department of the University of Tennessee, Ministry of the Aegean, Municipality of Mytilene, Prefecture of Lesbos.

The EU Network School on the Origin of the Universe is organized by "UniverseNet" (MRTN-CT-2006-005863) funded by the European Commission.

Both schools will be held in the Municipal Theatre of Mytilene, courtesy of the Municipality of Mytilene.

Information: <http://www.physics.ntua.gr/cosmo07>
Deadline for applications: 16 July 2007

We have just held a very stimulating and enjoyable school ... with 160 participants (about half were from *outside* the network)

Many thanks to the Lecturers, all the students, and, especially, our local organisers (Fani, Lefteris, Vassilis, ...) for all their hard work

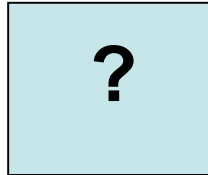
What else has the network done in the past year?

- **Performed collaborative research** on the key science objectives - reports to be given by the 'Task coordinators'
- **Appointed young researchers** (6 *Early Stage Researchers* and 9 *Experienced Researchers*) in 11 of the Network Teams
- **Organised conferences and schools**
- **Outreach activities** (popular talks, articles ...)

Early Stage Researchers (ESRs) appointed by UniverseNet



Wessel Valkenburg
LAPTH, Annecy



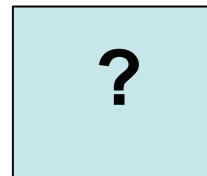
Phillipp Mertsch
Univ of Oxford



Anna Kostouki
King's College, London



Diana Battefeld
Univ of Helsinki



Yiannis Dalianis
Warsaw Univ

Suchita Kulkarni
Bonn Univ



Experienced Researchers (ERs)

Univ of Paris VII



Eugeny Babichev



Narendra Sahu

Lancaster Univ



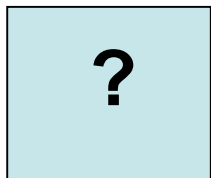
Nicolas Chatillon

Univ of Ioannina

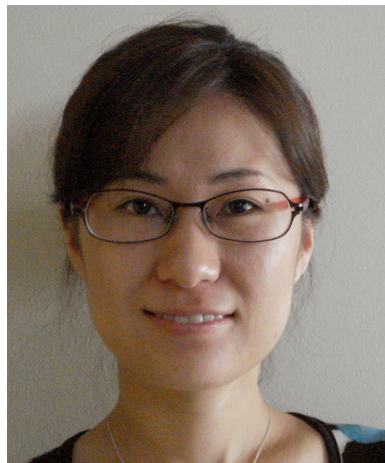
IFAE Barcelona



Thomas Konstandin



Hael Collins
NBI Copenhagen



Eun-Kyung Park

Univ of Bonn



Katarzyna Zuleta



**Gerasimos
Rigopoulos**

Univ of Helsinki



Paul Hunt

Warsaw Univ

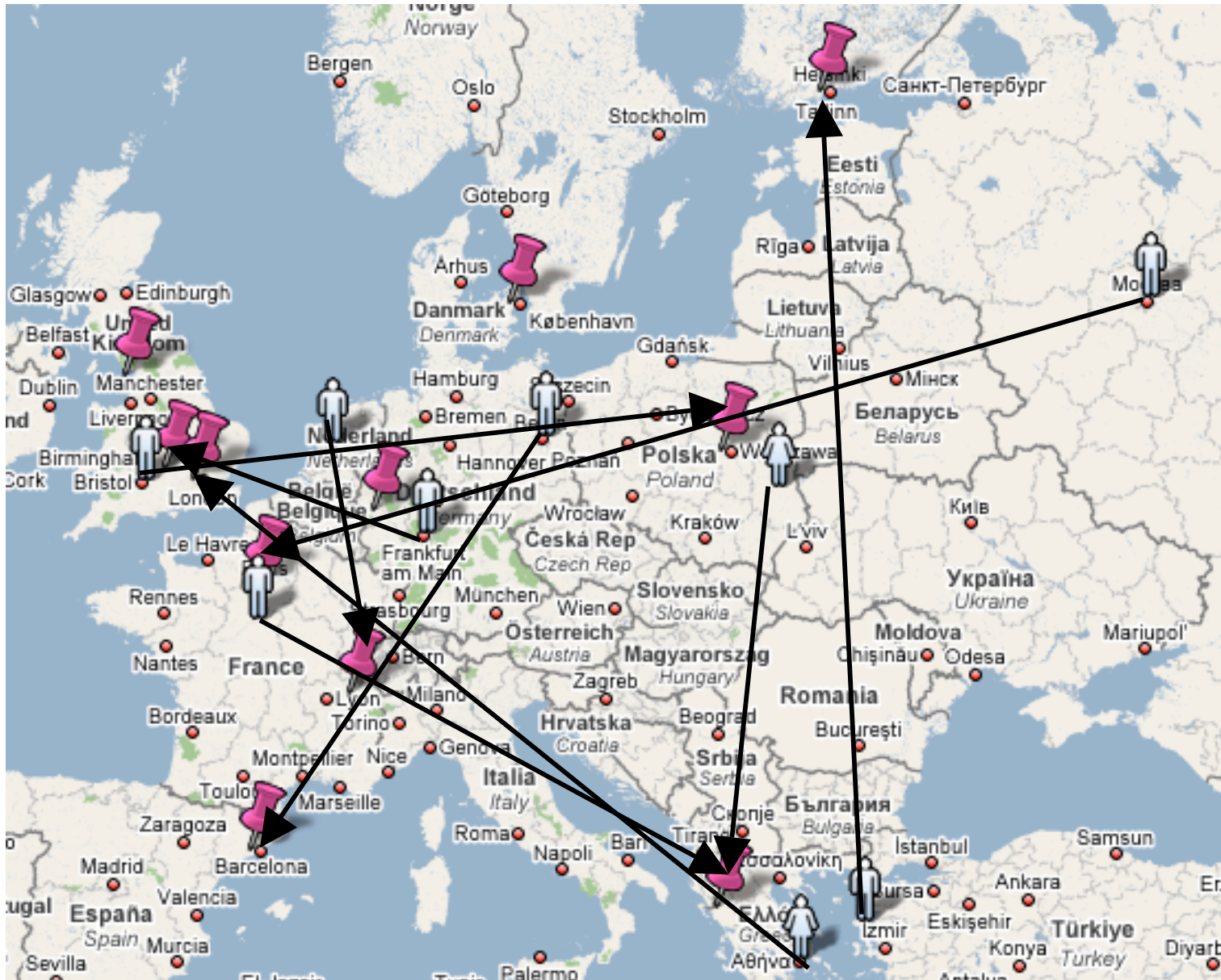
Young Researcher	Supervisor	Mentor
1. Oxford (ESR): Phillipp Mertsch	Subir Sarkar	Herbi Dreiner
2. Lancaster (ER): Narendra Sahu	John McDonald	Serguey Petcov
3. KCL (ESR): Anna Kostouki	Nick Mavromatos	Smaragda Lola
4. Barcelona (ER): Thomas Konstandin	Mariano Quiros	Christophe Grojean
5. Bonn (ESR): Suchita Kulkarni	Manuel Drees	Sacha Davidson
5. Bonn (ER): Eun-Kyung Park	Manuel Drees	Celine Boehm
7. Copenhagen (ER): Hael Collins	Anupam Majumdar	Denis Comelli
9. Helsinki (ESR): Diana Battefeld	Kari Enqvist	Mairi Sakellariadou
10. Helsinki (ER): Gerasimos Rigopoulos	Kari Enqvist	Kostas Dimopoulos
11. Ioannina (ER): Nicolas Chatillon	Kyriakos Tamvakis	David Langlois
12. Ioannina (ER): Katarzyna Zuleta	Kyriakos Tamvakis	Ruth Gregory
13. Paris VII (ER): Eugeny Babichev	Pierre Binetruy	Krzysztof Meissner
14. Annecy (ESR): Wessel Valkenburg	Julien Lesgourgues	Steen Hannestad
15. Warsaw (ER): Paul Hunt	Zygmunt Lalak	Graham Ross

UniverseNet

PART C: CONTRACT DELIVERABLES (from A4b of the CPF forms)

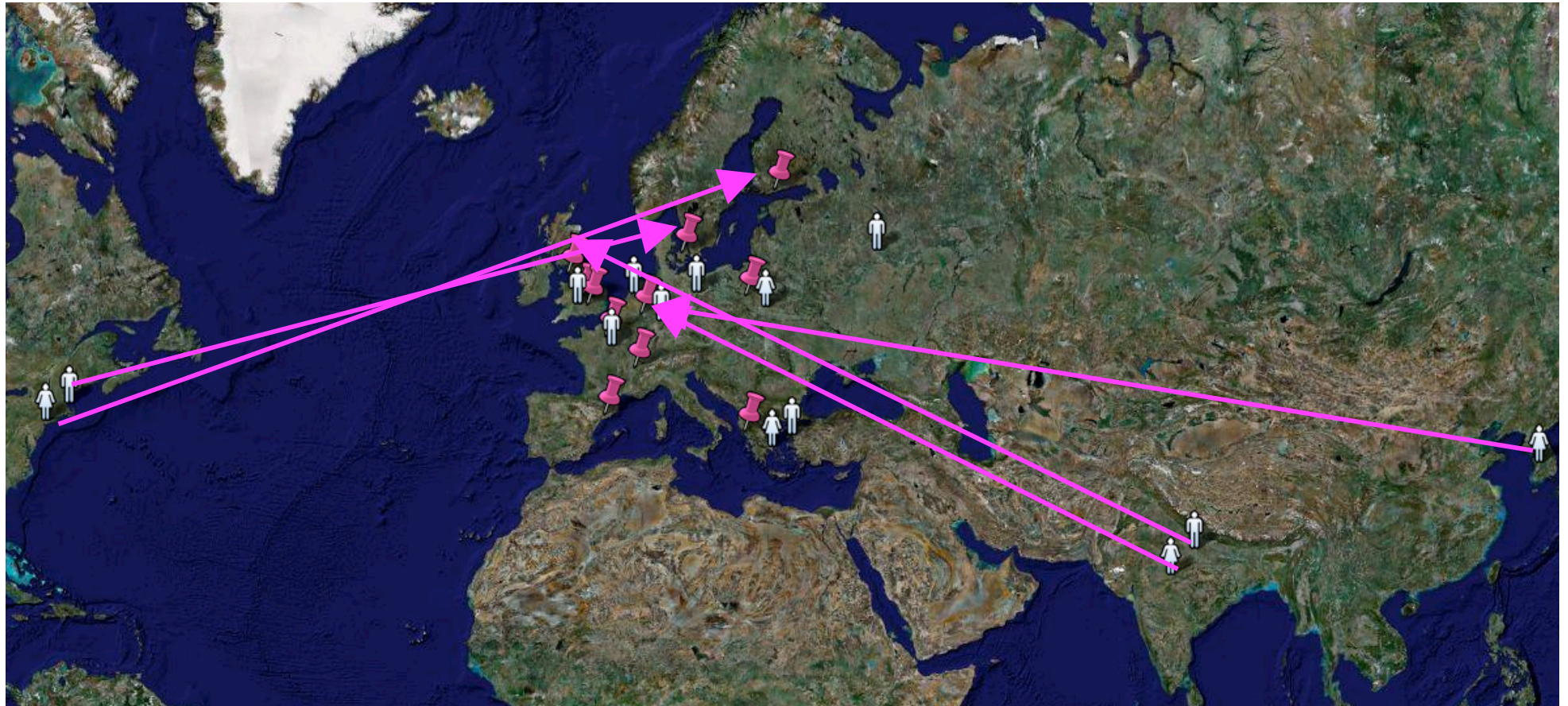
Proposal Number ¹	035863-2			Proposal Acronym ²	UniverseNet	
Overall Indicative Periodic Project Deliverables by Participant						
Participant No	Early Stage Researchers			Experienced Researchers (4-10 years)		
	Full-time Person Months	Indicative number of researchers	Type B fellowship (%)	Full-time Person Months	Indicative number of researchers	Type B fellowship (%)
1	36	1	100%	24	1	0%
2	0	0	0%	24	1	0%
3	36	1	0%	0	0	0%
4	36	1	0%	24	1	0%
5	18	1	0%	24	1	0%
6	18	1	0%	0	0	0%
7	0	0	0%	0	0	0%
8	24	8	0%	0	0	0%
9	24	1	0%	24	1	0%
10	0	0	0%	48	2	0%
11	36	2	0%	24	1	0%
12	0	0	0%	24	1	0%
13	36	1	0%	0	0	0%
14	36	1	0%	24	1	0%
15	0	0	0%	0	0	0%
16	0	0	0%	12	1	0%
Sub-Total	300	18		252	11	

UniverseNet Mobility I



Google map

Mobility II



Google map

Universenet Website: New viewers across the world



Distance in which individuals are clustered: ● = 100 - 999 ● = 10 - 99 ● = 1 - 9 visits

The above map depicts: 1,639 NEW visitors from 5 Apr 2007 to 14 Sep 2007

Selected *inter-team* publications (out of 65 total)

A Covariant generalization of cosmological perturbation theory.

Kari Enqvist (Helsinki Inst. of Phys. & Helsinki U.) , Janne Hogdahl (Helsinki Inst. of Phys.) , Sami Nurmi (Helsinki U.) , Filippo Vernizzi (Helsinki Inst. of Phys. & ICTP, Trieste) . HIP-2006-48-TH, Nov 2006. 22pp.

Published in Phys.Rev.D75:023515,2007. e-Print: gr-qc/0611020

A Novel string derived Z-prime with stable proton, light-neutrinos and R-parity violation.

Claudio Coriano (Lecce U. & INFN, Lecce) , Alon E. Faraggi (Liverpool U., Dept. Math.) , Marco Guzzi (Lecce U. & INFN, Lecce) . LTH-742, Apr 2007. 16pp.

e-Print: arXiv:0704.1256 [hep-ph]

Are small neutrino masses unveiling the missing mass problem of the universe?

Celine Boehm (Annecy, LAPTH) , Yasaman Farzan (IPM, Tehran) , Thomas Hambye (Madrid, Autonoma U.) , Sergio Palomares-Ruiz, Silvia Pascoli (Durham U., IPPP) . Dec 2006. 4pp.

e-Print Archive: hep-ph/0612228

Dilaton and off-shell (non-critical string) effects in Boltzmann equation for species abundances.

A.B. Lahanas (Athens U.) , N.E. Mavromatos (King's Coll. London) , Dimitri V. Nanopoulos (Texas A-M & HARC, Woodlands & Athens Academy) . ACT-06-06, MIFP-06-20, Aug 2006. 12pp.

e-Print: hep-ph/0608153

Gauge invariant MSSM inflaton.

Rouzbeh Allahverdi (Perimeter Inst. Theor. Phys. & McMaster U.) , Kari Enqvist (Helsinki U. & Helsinki Inst. of Phys.) , Juan Garcia-Bellido (Madrid, Autonoma U.) , Anupam Mazumdar (Nordita) . NORDITA-2006-13, IFT-UAM-CSIC-06-18, HIP-2006-22-TH, May 2006. 4pp.

Published in Phys.Rev.Lett.97:191304,2006.

e-Print: hep-ph/0605035

Greybody factors for brane scalar fields in a rotating black-hole background.

S. Creek (Durham U., Dept. of Math.) , O. Efthimiou (Ioannina U.) , P. Kanti (Durham U., Dept. of Math. & Ioannina U.) , K. Tamvakis (Ioannina U.) . Jan 2007. 31pp.

e-Print Archive: hep-th/0701288

MSSM flat direction inflation: Slow roll, stability, fine tuning and reheating.

Rouzbeh Allahverdi (Perimeter Inst. Theor. Phys.) , Kari Enqvist (Helsinki U. & Helsinki Inst. of Phys.) , Juan Garcia-Bellido (Madrid, Autonoma U.) , Asko Jokinen (Nordita & Montpellier U., Astropart. Group) , Anupam Mazumdar (Nordita) . IFT-UAM-CSIC-06-47, Oct 2006. 33pp.

e-Print Archive: hep-ph/0610134

Non-Perturbative Flat Direction Decay.

Anders Basboll (Aarhus U.) , David Maybury, Francesco Riva, Stephen M. West (Oxford U., Theor. Phys.) . OUTP-0702P, Mar 2007. 4pp.

e-Print: hep-ph/0703015

Non-perturbative formulation of non-critical string models.

Jean Alexandre (King's Coll. London) , John R. Ellis (King's Coll. London & CERN) , Nikolaos E. Mavromatos (King's Coll. London) . CERN-PH-TH-2006-240, Nov 2006. 16pp.

Published in JHEP 0703:060,2007.

e-Print: hep-th/0611228

Non-Perturbative Formulation of Time-Dependent String Solutions.

Jean Alexandre (King's Coll. London) , John R. Ellis (King's Coll. London & CERN) , Nikolaos E. Mavromatos (King's Coll. London) . CERN-PH-TH-2006-201, Oct 2006. 15pp.

Published in JHEP 0612:071,2006.

e-Print: hep-th/0610072

On the Onset of Inflation in Loop Quantum Cosmology.

Cristiano Germani (SISSA, Trieste & INFN, Trieste) , William Nelson, Mairi Sakellariadou (King's Coll. London) . SISSA-85-2006-EP, Jan 2007. 18pp.

e-Print: gr-qc/0701172

Regularization of conical singularities in warped six-dimensional compactifications.

Eleftherios Papantonopoulos (Natl. Tech. U., Athens) , Antonios Papazoglou (APC, Paris & Paris U. VI, GRECO & IPT, Lausanne) , Vassilios Zamarias (Natl. Tech. U., Athens) . Nov 2006. 22pp.

Published in JHEP 0703:002,2007.

e-Print Archive: hep-th/0611311

Relaxation dark energy in non-critical string cosmologies and astrophysical data.

Nikolaos E. Mavromatos (King's Coll. London) , Vasiliki A. Mitsou (Valencia U., IFIC & CERN) . Nov 2006. 12pp.

Invited talk at IDM 2006: 6th International Workshop on the Identification of Dark Matter, Island of Rhodes, Greece, 11-16 Sep 2006.

e-Print: astro-ph/0611788

Smoothly evolving supercritical-string dark energy relaxes supersymmetric-dark-matter constraints.

A.B. Lahanas (Athens U.) , N.E. Mavromatos (King's Coll. London) , Dimitri V.

Nanopoulos (Texas A-M & HARC, Woodlands & Athens Academy) . ACT-09-06, MIFP-06-34, Dec 2006. 13pp.

Published in Phys.Lett.B649:83-90,2007.

e-Print: hep-ph/0612152

Stuckelberg axions and the effective action of anomalous Abelian models. 1. A Unitarity analysis of the Higgs-axion mixing.

Claudio Coriano (Lecce U. & INFN, Lecce & Liverpool U., Dept. Math.) , Nikos Irges (Crete U.) , Simone Morelli (Lecce U. & INFN, Lecce & Liverpool U., Dept. Math.) . Jan 2007. 73pp.

dedicated to the memory of Hidenaga Yamagishi.

e-Print: hep-ph/0701010

The Smallest neutrino mass.

Sacha Davidson (Lyon, IPN) , Gino Isidori (Frascati) , Alessandro Strumia (Pisa U. & INFN, Pisa) . IFUP-TH-06-23, Nov 2006. 6pp.

Published in Phys.Lett.B646:100-104,2007.

e-Print Archive: hep-ph/0611389

Towards Minkowski Vacua in Type II String Compactifications.

Andrei Micu (Bonn U.) , Eran Palti, Gianmassimo Tasinato (Oxford U.) . Jan 2007. 33pp.

Published in JHEP 0703:104,2007.

e-Print Archive: hep-th/0701173

... many other publications by the young researchers as well as senior members of the network on all the key topics of interest

Please tell Ana when you have published a paper and remember to thank the network for support!

Conferences and schools

[International School on Astro-Particle Physics: Dark Matter and Dark Energy](#), 28 Sep-5 Oct 2006, Sorrento (*SAC includes S. Hannestad, A. Masiero; Lecturers include A. Masiero*)

[Constituents, Fundamental Forces and Symmetries of the Universe](#), 9-13 Oct 2006, Napoli (*Plenary speakers include T. Mohaupt*)

[Physics Of The Early Universe Confronts Observations: WMAP 2006](#), 26-28 Oct 2006, Paris (*Plenary speakers include S. Hannestad, P. Naselsky*)

[Workshop On High Energy, Cosmology And Strings](#), 11-15 Dec 2006, Paris (*Lecturers include V. Mukhanov*)

[5th Nordic Winter School in Particle Physics and Cosmology](#), 7-12 Jan 2007, Gausdal (*Lecturers include S. Sarkar*)

[Frontiers in Particle Physics and Cosmology](#), 6-8 Feb 2007, Tsukuba (*Plenary speakers include P. Ullio*)

[Low-energy, Astroparticle Underground, Neutrino physics and Cosmology in Heidelberg](#), 21-23 Mar 2007, Heidelberg (*Plenary speakers include M. Drees, S. Hannestad, S. Petcov*)

[Outstanding questions for the standard cosmological model](#), 26-29 Mar 2007, London (*Plenary speakers include P. Ferreira, S. Sarkar*)

[UK BSM 2007](#), 29-30 Mar 2007, Liverpool (*Organisers include S. Abel, A. Faraggi*)

[XIX^emes Rencontres de Blois: Matter and energy in the Universe](#), 20-26 May 2007, Blois (*Organisers include J. Silk; Speakers include J. Silk*)

[String Phenomenology 2007](#), 4-8 Jun 2007, Frascati (*IAC includes S. Abel, J. Ellis, A. Faraggi, Z. Lalak, H.P. Nilles, S. Pokorski, S.J. Rey, G. Ross*)

[International School on Astro-Particle Physics: Multi-messenger approach in high energy astrophysics](#), 4-15 Jun 2007, Seillac (*SAC includes S. Hannestad, A. Masiero, C. Munoz; Lecturers include A. Masiero*)

Conferences & Schools II

PLANCK 07: From the Planck Scale to the Electroweak Scale, 9-13 Jun 2007, Warsaw

(SOC includes R. Barbieri, J. Ellis, H.P. Nilles, S. Pokorski, M. Quiros, G. Ross, G. Senjanovic; LOC includes P. Chankowski, Z. Lalak, S. Pokorski)

From Quantum to Emergent Gravity: Theory and Phenomenology, 11-15 Jun 2007, Trieste

(Plenary speakers include N. Mavromatos; LOC includes R. Percacci)

Cosmology, Strings, and Phenomenology, 15-20 Jun 2007, Stockholm

(AC includes V. Mukhanov, A. Smirnov; Nordic AC includes K. Enqvist, A. Brandenberg, S. Hannestad, P. Olesen; LOC includes A. Mazumdar; Speakers include J. Ellis, K. Enqvist, S. Hannestad, V. Mukhanov, S. Sarkar)

Energetic Events in the Universe: From Physics to Cosmology, 25-28 Jun 2007, Marseille

(Plenary speakers include S. Mukhanov, P. Salati)

Strings'07, 25-29 Jun 2007, Madrid (Organizing Committee includes A. Casas, C. Munoz)

394th WE-Heraeus Seminar: Cosmology of Fundamental Interactions, 22-27 Jul 2007, Bad Honnef

(Plenary speakers include M. Sakellariadou)

LHC - Cosmology interplay, 25 Jun-10 Aug 2007, Geneva . (Co-organised by J. Ellis)

PASCOS 07: 13th International Symposium On Particles, Strings and Cosmology, 2-7 Jul 2007, London

(IAC includes J. Silk; Speakers include J. Ellis, G. Ross, J. Silk)

ICTP Workshop on Cosmology and Strings, 9-13 Jul 2007, Trieste. (Organisers include L.Boubekeur, P. Creminelli, F.Vernizzi)

Cosmology and Particle Physics Beyond the Standard Models, 30 Jul-11 Aug 2007, Cargese

(Organisers include G. Servant; Lecturers include S. Abel, P. Salati, R. Taillet)

TeV Particle Astrophysics III, 27-31 Aug 2007, Venice

(Plenary speakers include G. Servant, G. Sigl; Steering Committee includes G. Bertone; LOC includes A. Masiero, M. Pietroni, A. Riotto)

International Conference on Topics in Astroparticle and Underground Physics (TAUP), 11-15 Sep 2007, Sendai

(IAC includes J. Ellis, P. Salati)

Next year's School

Oxford, 22-26 September 2008



Mid Term Review of Network



University College



Martin Wood Lecture Theatre

Thanks to Ana Malhado for her
help in preparing this report



... and see you next year in Oxford