



MPNS



Materials, Physics & Nanosciences

Laurens KATGERMAN

MPNS Domain Committee Vice-Chair



Content overview

- Domain description
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Domain description

http://www.cost.eu/domains_actions/mpns

The Domain is home to **material science**, extending from **conception through to production** including characterization, examination, evaluation, fabrication and development, to actual application and service, as well as related databases, codes, standards and inspections.

Also incorporates **nanomaterials** and **nanosciences** and the **nanotechnological applications** thereof.

It also supports exploratory **basic and applied** research in **physics, theoretical and experimental**, as a key to understanding the laws governing the behaviour of matter and energy.

Domain history & composition

- 1971 Domain “Materials”; 1997 Domain “Physics” ; 2006 Domain MPNS = Materials, Physical & Nanosciences became Materials, Physics & Nanosciences; 2010 Materials, Physics & Nanosciences
- 32 DC delegates & DC Chair Anthony Flambard (DE, 2010), Vice-Chair Laurens Katgerman (NL, 2011), BA, LU, MK, SE not currently represented
- March 2013 - 36 running MPNS Actions (includes 6 TD)

Domain portfolio

Historically supportive to CH topics

Recently welcoming entirely new communities in cold matter-, quantum-, astro- & social- physics

Physics

Micro-CoR, NMR, MRI

Photonics

metrology

Optofluidics

Plasmas

Magnetism

Bio-inspired

Cultural heritage

Polarization

Composites

Adhesives

Statistics

Interfaces

III-V-N Gain materials

Quantum

Self-assembly

Artificial Muscles

Bubbles & drops

Novel functionalities

Flame retardancy

particles, wires, tubes, devices

Materials

NanoScience

MPNS

1. *TD1210 Analyzing the dynamics of information and knowledge landscapes – KNOWeSCAPE*
2. **MP1210 The String Theory Universe**
3. MP1209 Thermodynamics in the quantum regime
4. MP1208 Developing the Physics and the Scientific community for Inertial Confinement Fusion at the time of NIF ignition
5. MP1207 Enhanced X-ray Tomographic Reconstruction: Experiment, Modeling, and Algorithms
6. MP1206 Electrospun Nano-fibres for bio inspired composite materials and innovative industrial applications
7. *TD1204 Modelling Nanomaterial Toxicity (MODENA)*
8. *TD1201 Colour and Space in Cultural Heritage (COSCH)*
9. MP1205 Advances in Optofluidics: Integration of Optical Control and Photonics with Microfluidics
10. MP1204 TERA-MIR Radiation: Materials, Generation, Detection and Applications

Domain portfolio

http://www.cost.eu/domains_actions/mpns/Actions

11. MP1203 Advanced X-ray spatial and temporal metrology
12. MP1202 Rational design of hybrid organic-inorganic interfaces: the next step towards advanced functional materials
13. MP1201 Nanoscale Superconductivity: Novel Functionalities through Optimized Confinement of Condensate and Fields (NanoSC -COST)
14. MP1106 Smart and green interfaces - from single bubbles and drops to industrial, environmental and biomedical applications (SGI)
15. MP1105 Sustainable flame retardancy for textiles and related materials based on nanoparticles substituting conventional chemicals (FLARETEX)
- 16. MP1104 Polarization as a tool to study the Solar System and beyond**
17. MP1103 Nanostructured materials for solid-state hydrogen storage
18. MP1102 Chemical imaging by Coherent Raman microscopy – microCoR
19. MP1101 Biomedical Applications of Atmospheric Pressure Plasma Technology
20. *TD1103 European Network for Hyperpolarization Physics and Methodology in NMR and MRI*



Domain portfolio

http://www.cost.eu/domains_actions/mpns/Actions

21. *TD1007 Bimodal PET-MRI molecular imaging technologies and applications for in vivo monitoring of disease and biological processes*
22. **MP1006 Fundamental Problems in Quantum Physics**
23. MP1005 From nano to macro biomaterials (design, processing, characterization, modeling) and applications to stem cells regenerative orthopedic and dental medicine (NAMABIO)
24. MP1004 Hybrid Energy Storage Devices and Systems for Mobile and Stationary Applications
25. MP1003 European Scientific Network for Artificial Muscles (ESNAM)
26. MP1002 Nano-scale insights in ion beam cancer therapy (Nano-IBCT)
27. MP1001 Ion Traps for Tomorrow's Applications
28. *TD0906 Biological adhesives: from biology to biomimetics*
29. **MP0905 Black Holes in a Violent Universe**
30. MP0904 Single- and multiphase ferroics and multiferroics with restricted geometries (SIMUFER)

31. MP0903 Nanoalloys as advanced materials: from structure to properties and applications (NANOALLOY)

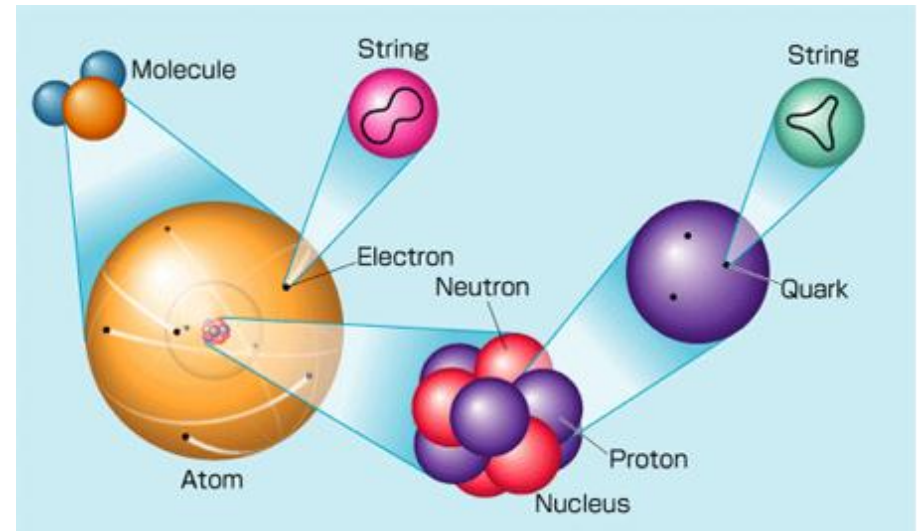
Ending Actions 2013

32. MP0902 Composites of Inorganic Nanotubes and Polymers (COINAPO)
33. MP0901 Designing novel materials for nanodevices - from Theory to Practice (NanoTP)
34. MP0806 Particles in turbulence
35. MP0805 Novel Gain Materials and Devices Based on III-V-N Compounds
36. MP0804 Highly Ionised Pulse Plasma Processes

MP1210 The String Theory Universe

Objective

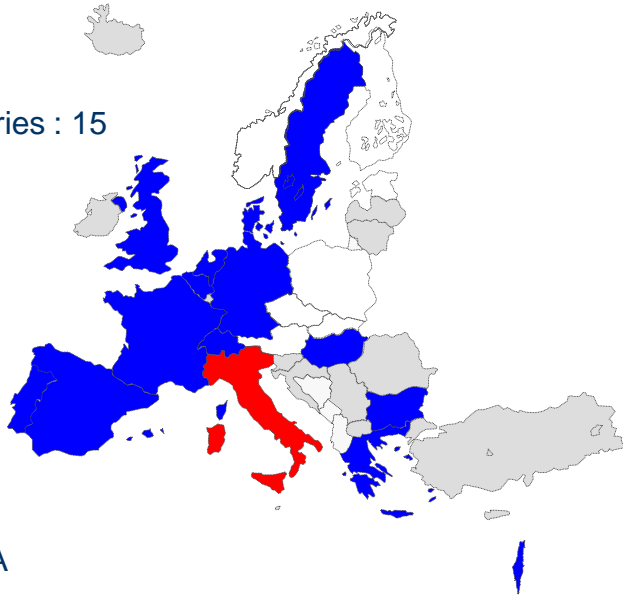
Fundamental, forefront research exploring the role played by String Theory in Particle Physics, Cosmology and Condensed Matter Physics.



Interested Countries : 15

Proposer : **IT**

BE, BG, CH, DE,
DK, EL, ES, FR,
HU, IL, NL, PT,
SE, UK



NON-COST : ZA

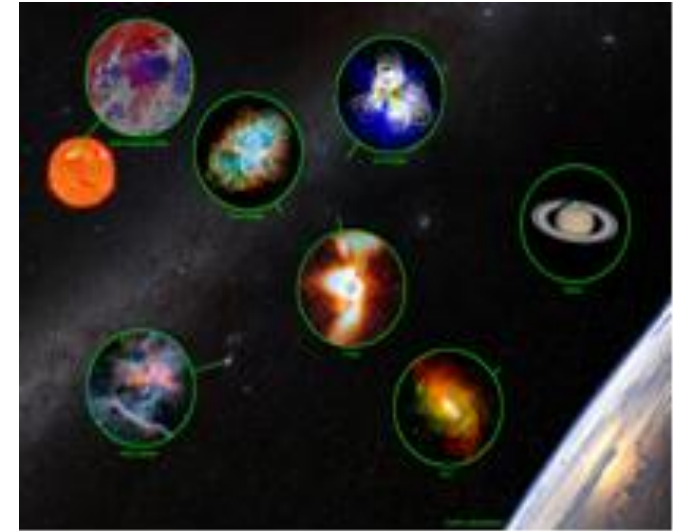
WG1 Equilibration & thermalisation,
emergence of canonical states
WG2 Thermodynamic and information
theoretic relations for general quantum
systems
WG3 Implementations: from classical to
quantum thermodynamic experiments

Silvia Penati <Silvia.Penati@mib.infn.it>

MP1104 Polarization as a tool to study the Solar System and beyond

Objective

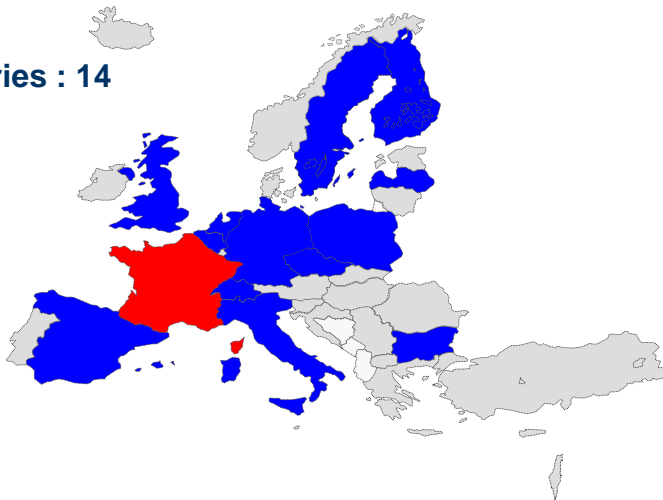
to promote polarimetry to advance knowledge about astrophysical objects within the Solar System and beyond



Interested Countries : 14

Proposer : FR

BE, BG, CH, CZ,
DE, ES, FI, FR, IT,
LV, NL, PL, SE,
UK



WG1	Theory and modeling
WG2	Observations
WG3	Instrumentation
WG4	Experimentation

Non-COST participation: ZA, AR, UA, US



EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

Hervé Lamy <herve.lamy@aeronomie.be>

MP1104 Polarization as a tool to study the Solar System and beyond



MP1104 Polarization as a tool to study the Solar System and beyond



MP1006 Fundamental Problems in Quantum Physics (FPQP)

Objectives

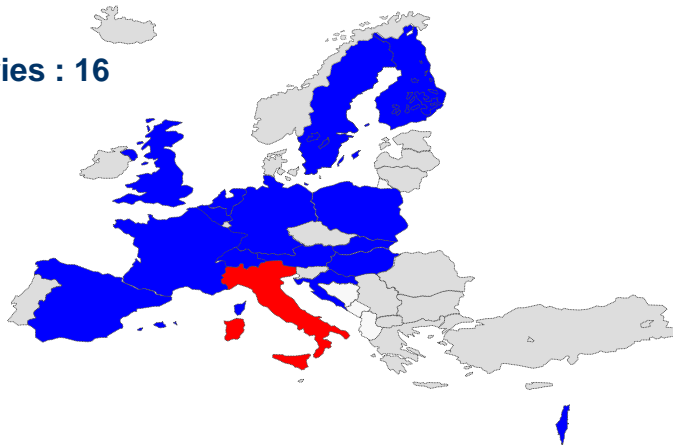
to clarify quantum mechanics and its meaning, the quantum-to-classical transition, the connection with relativity, and to test its limits of validity.



Interested Countries : 16

Proposer : **IT**

AT, BE, CH, DE,
ES, FI, FR, HR,
HU, IL, NL, PL,
SE, SK, UK



Angelo Bassi <angelo.bassi@gmail.com>

- | | |
|-----|---|
| WG1 | Quantum theory without observers |
| WG2 | Effective descriptions of complex systems |
| WG3 | Quantum theory meets relativity |
| WG4 | From theory to experiments |

MP0905 Black Holes (BH) in a Violent Universe



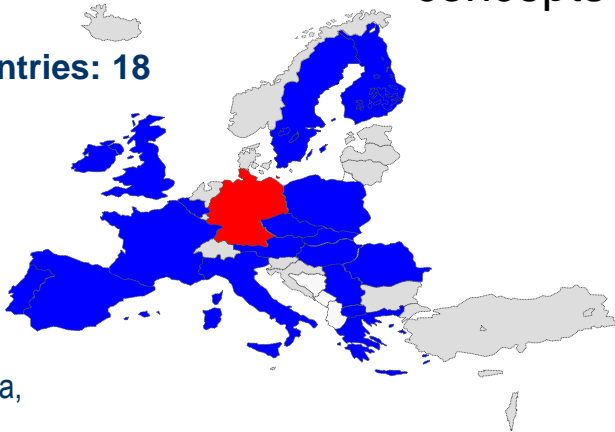
Objectives

- To enhance the understanding of the BH-phenomenon and its impact on the evolution of our Universe
- To study the fundamental laws of nature using a multi-disciplinary and multi-dimensional approach of BH research
- To use BHs as laboratories to test new physical concepts

Interested Countries: 18

Proposer: **DE**

AT, BE, CZ,
ES, FI, FR,
GR, HU, IE, IT,
PL, PT, RO,
RS, SI, SE, UK



Non-COST: Australia,
Georgia, Lebanon,
Russia, South Africa

WG1	Quantum Black Holes
WG2	Stellar Black Holes & Pulsars
WG3	The Galactic Centre
WG4	Supermassive Black Holes

Silke Britzen <sbritzen@mpifr-bonn.mpg.de>

Materials in a resource-constrained world

18-20 Nov. 2013, Delft, The Netherlands



This MPNS-ICT-ESSEM transdisciplinary Science & Technology Strategic Event about 'Materials in a resource constrained world' targets break-through scientific developments leading to new concepts and products by bringing together scientists from different disciplines to find the way forward for a holistic approach which is needed to solve the problem of materials scarcity in the near future.

The event aims to bring together policy-makers and scientists across different scientific disciplines to: 1) analyze the magnitude of the problem of the increasing demands on the planets' raw materials and natural resources, 2) explore potential solution strategies: the Sustainable exploration, extraction, processing, recycling and substitution of critical raw materials, 3) discuss the way forward.

Key words: Resource-Efficiency, 'non energy, non-agricultural raw materials', 'sustainable exploration, extraction, processing, recycling and substitution'

Domains involved

A. FLAMBARD, MPNS DC Chair
S. LOUCA, ICT DC Chair
D. SCHINZER, CMST DC Chair

Workshop Chair & Vice-Chair

S. Erik OFFERMAN

L. KATGERMAN

Delft University of Technology

Steering Committee

M. MENTE (ESSEM)

H. SCHMIEDEL (ICT)

D. BOL (2Mi)

C. WHELAN (COST)

Domain Contacts



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