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**Optical micro-manipulation by  
nonlinear nanophotonics  
and functional sub-wavelength  
photonic structures  
in COST Actions MP0604 and MP0702**

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XVIII Lithuanian – Belarussian seminar “LASERS AND OPTICAL NONLINEARITY”,  
16-18 September 2009, Vilnius, Lithuania



# Outline

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- **About COST**
- **COST Action MP0604**
- **COST Action MP0702**
- **Lithuanian COST MP0604 and MP0702 activities**
- **Opportunities for Belarus**

# About COST

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**COST (European Cooperation in Science and Technology)** is one of the longest-running European instruments supporting cooperation among scientists and researchers across Europe

<http://www.cost.esf.org/>

## **9 Key Scientific Domains and 200 Actions**

**Domain: Materials, Physical and Nanosciences (MPNS)**  
**COST Actions MP0604 and MP0702**

**Memorandum of Understanding**

**COST is Open Network**

Main funding for conferences  
2 conferences and 1-2 schools per year  
Short term scientific missions (STSM)

# COST Action MP0604 “Optical Micro-Manipulation by Nonlinear Nanophotonics”

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Chairman: **Prof. Francesco Simoni**

Università Politecnica delle Marche, Ancona, Italy

Vice-chairman: **Prof. Cornelia Denz**

Wilhelms Universität, Münster, Germany

## **18 Participating EU Countries:**

Austria, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Portugal, Slovenia, Spain, Sweden, Switzerland, United Kingdom

**Non-COST country:** Australia

End of Action : 20/05/2011

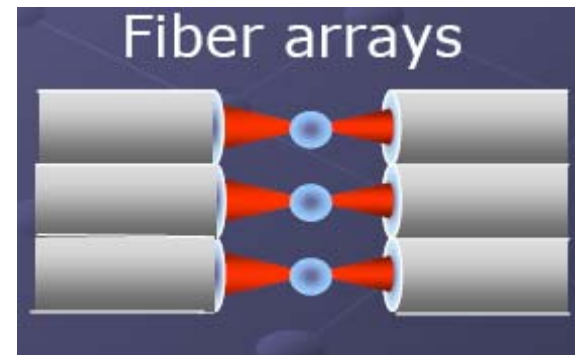
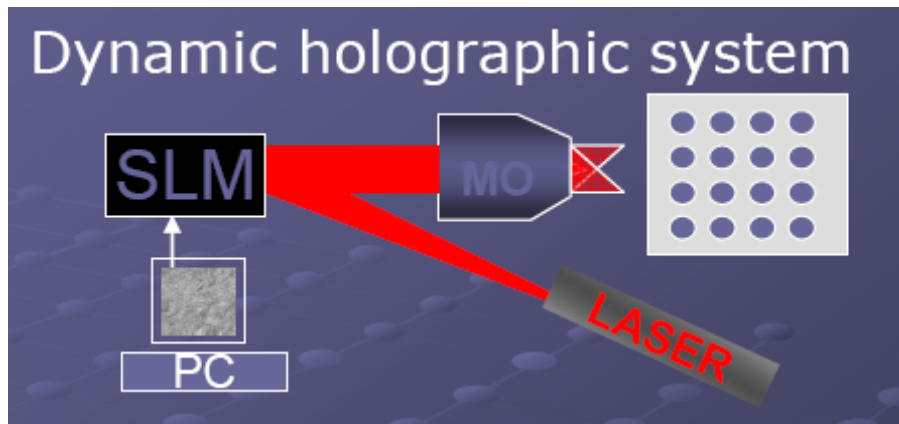
<http://www.photomat.it/cost/MP0604.html>

# Working Groups and main scientific objectives:

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## *WG1 - Methods of Optical Micro-Manipulation*

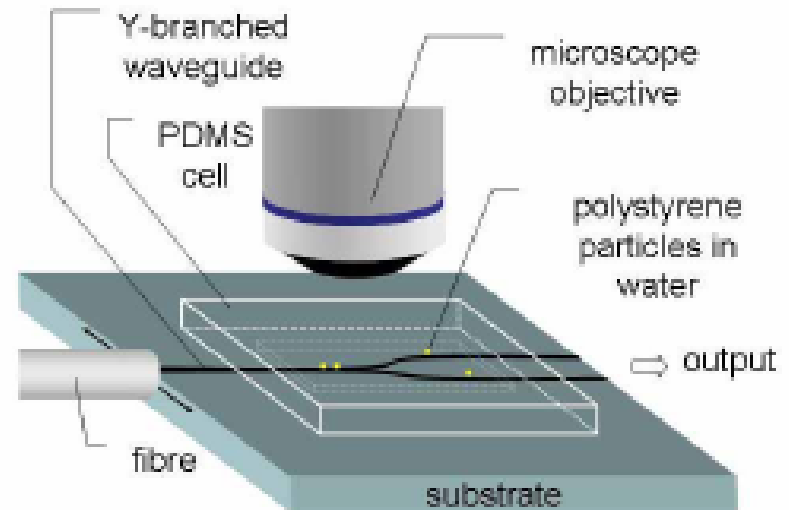
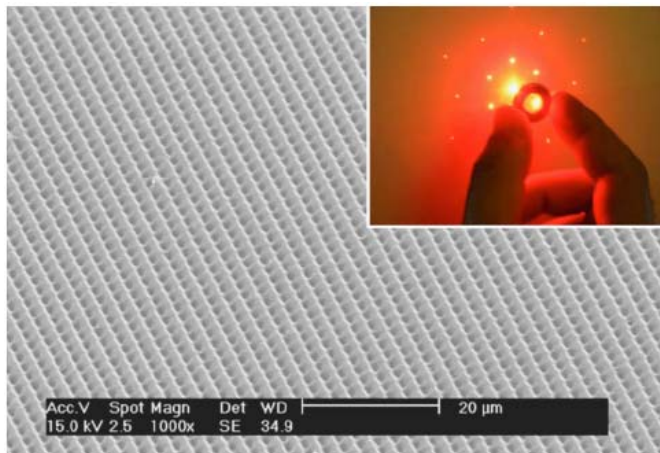
- Investigation of novel approaches to optical manipulation
- Advancement in the real-time, interactive, and arbitrary control of many micro-particles in 2D and 3D by optical manipulation



# Working Groups and main scientific objectives:

## *WG2 - Micro-patterning and Microfluidics*

- Realization of nano and micro-structures by photo-patterning of polymeric materials
- Investigation on microfluidics



## *WG3 - Imaging and Biological Applications*

# COST Action MP0702 “Towards Functional Sub-Wavelength Photonic Structures”

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Chairman: **Prof. Marian MARCINIAK**

National Institute of Telecommunications, Warsaw, Poland

Vice-chairman: **Prof. Concita SIBILIA**

Universita di Roma "la Sapienza", Roma, Italy

**27 Participating EU Countries:** Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom

**Non-COST country:** Armenia, Russian Federation, Ukraine, Morocco, Australia, New Zealand, South Africa

End of Action : 20/01/2012

<http://cost-mp0702.nit.eu/cost-mp0702/>

# Working Groups and main scientific objectives:

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## ***WG1 - Plasmonics, Metamaterials, and Non-reciprocity***

- Plasmonics
- Metamaterials
- Non-reciprocity, magnetophotonic crystals

## ***WG2 - Photonic devices with periodicity and hybrid material systems***

- Photonic crystal and microcavity structures for lasing, sensing and telecom applications
- Hybrid planar components for enhanced nonlinear functionalities

# Working Groups and main scientific objectives:

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## *WG3 - New functionalities*

- Non-linear dynamics of photonic systems
- Non-linear light propagation phenomena
- Photonic-crystal fibres (PCFs)
- Photon-phonon interaction, photon-electron interaction
- Slow-light structures and devices

# Lithuanian COST MP0604 activities

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MC members:

## 1. Prof. Sigitas TAMULEVIČIUS

Institute of Physical Electronics,  
Kaunas University of Technology, Kaunas

- **Photo-patterning of polymeric materials**
- **Micro-structured devices for sensing**
- **Microfluidics devices**

## 2. Dr. Raimondas PETRUŠKEVIČIUS

Institute of Physics, Vilnius

- **Nonlinear photo-patterning of E-O polymeric waveguides**
- **Micromanipulation by all-optical poling**
- **Fiber tweezers and near-field trapping**

# Lithuanian COST MP0702 activities

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## MC members:

### 1. Dr. Rolandas TOMAŠIŪNAS

Institute of Materials Science and Applied Research,  
Vilnius University, Vilnius

- Plasmonic nanostructures
- All-optical poling of NLO polymers
- Quantum dots in microcavities

### 2. Dr. Raimondas PETRUŠKEVIČIUS

Institute of Physics, Vilnius

- Sub-wavelength diffractive optical elements (DOE)
- Hybrid E-O polymer photonic structures
- Micro-fiber and micro-hole arrays

# Opportunities for Belarus

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**For non-COST countries:**

**1. Reciprocal pilot schemes:**

Australian, New Zealand, South African researchers

**2. "Invited expert" for a specific COST meeting**

**3. Funding for Near Neighbour countries:**

(a sum of EUR 100 000)

Albania, Algeria, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Egypt, Georgia, Lebanon, Lybia, Moldova, Morocco, The Palestinian Authority, Russian Federation, Syria, Tunisia and Ukraine

The procedure is as follows: Support by MC - recommendation by Domain Committee - decision by Committee of Senior Officials (CSO)

**COST MP0702**

**Prof. IGOR A. GONCHARENKO**

Institute for Command Engineers, Ministry of Emergencies, Belarus