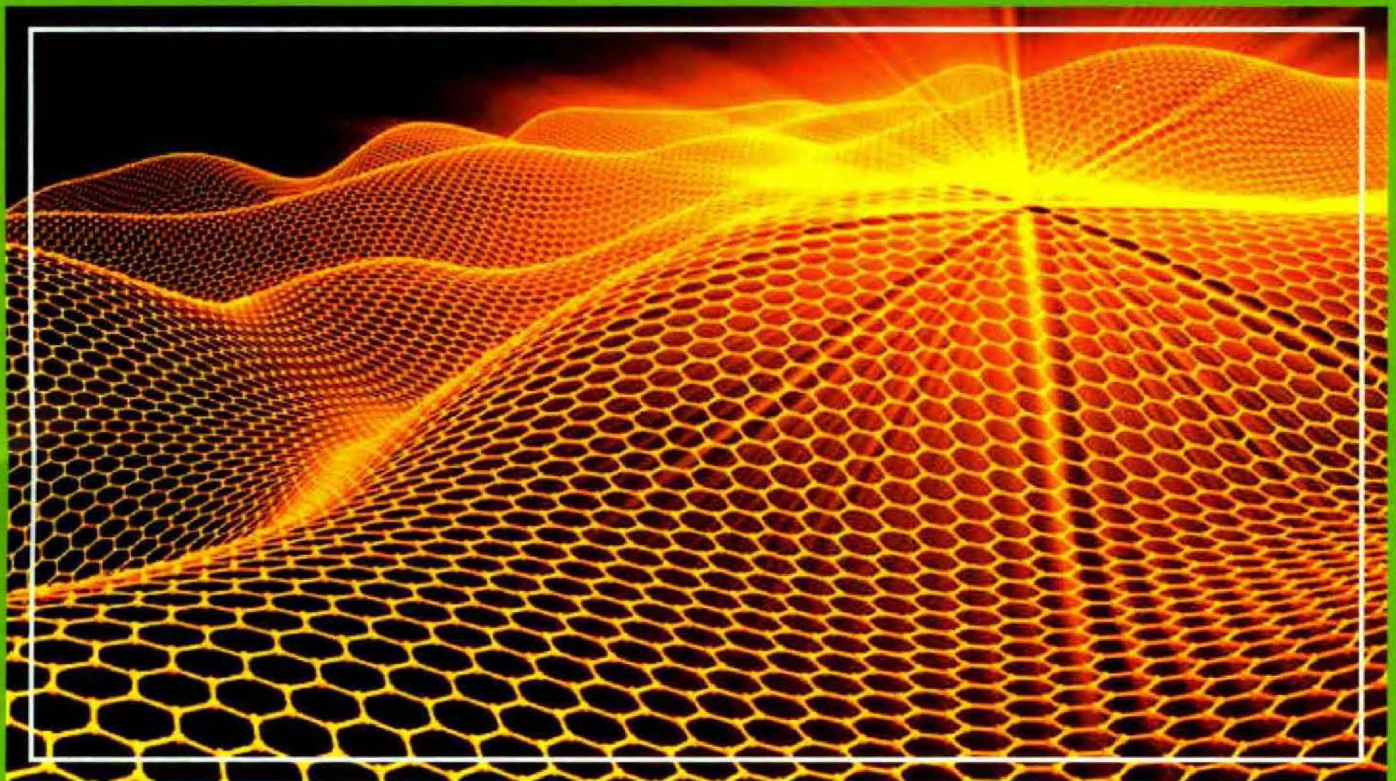


# Low-Dimensional Functional Materials

## NATO Advanced Research Workshop

*October 15-19, 2012, Tashkent, Uzbekistan*



### Organizers:

Institute for Applied Physics  
Uzbekistan Physical Society  
Turin Polytechnic University in Tashkent



Science for Peace and Security (SPS)  
North Atlantic Treaty Organisation

# Scientific Programme

NATO Advanced Research Workshop  
*Recent Trends in Energy Security:*  
*With Special Emphasis on Low-Dimensional Functional Materials*

15-19 October 2012

Tashkent, Uzbekistan

## Day 1, October 15

9:00-10:00      *Registration and coffee*

10:00-10:25    *Opening Ceremony*

### Morning Session Graphene, CNT and Fullerene

Chair: Vladimir Dyakonov

10:25-11:00    Reinhold Egger. *Strongly interacting Dirac fermions in graphene quantum dots.*

11:00-11:35    Anvar Zakhidov. *Carbon nanotube charge collectors in organic and hybrid tandem photovoltaic cells.*

11:35-12:10    Luis Brey. *Gapped phase in direct stacked bilayer graphene.*

12:10-12:45    Andreas Knorr. *Microscopic theory of ultrafast dynamics in graphene.*

### **Lunch break (13:00-14:30)**

### Afternoon Session The role of quantum confinement and size effects

in nanomaterials

Chair: Jongbae Hong

14:30-15:05    Paul C.W. Chu. *Superconductivity with higher  $T_C$  via nano-2D structures.*

15:05-15:40    Bakhodir Abdullaev. *Anyon bosonized 2d fermions or a single boson physics of cuprates: experimental evidences.*

### **Coffee Break (15:40-16:10)**

16:10-16:45    Akira Oguri.  *$1/(N-1)$  expansion for an Anderson impurity with  $N$ -fold degeneracy: a new large- $N$  scheme based on a perturbation theory in  $U$ .*

16:45-17:20    Farhan Saif. *Recurrence Tracking Microscopy - a new way to perform surface scanning*

17:20-17:35    Jelena Klinovaja. *From fractional to majorana fermions in rashba nanowires.*

### **Dinner (18:30-20:00)**

## Day 2, October 16

### Morning Session Graphene, CNT and Fullerene

Chair: Luis Brey

- 9:00-9:35 Joachim Burgdörfer. *Large-scale tight binding simulations for graphene quantum dots and nanoribbons.*
- 9:35-10:10 Eva Y. Andrei. *Landau level spectroscopy of graphene: exploring the influence of doping, edges and charged impurities.*
- 10:10-10:45 Aravind Vijayaraghavan. *Large-scale integration of graphene and carbon nanotube devices.*

### **Coffee Break (10:45-11:15)**

- 11:15-11:50 Mikito Koshino. *Anomalous magnetic field effects on graphene.*
- 11:50-12:25 Bart Partoens. *Ab initio studies of the adsorption of atoms and molecules on graphene.*
- 12:25-13:00 Bernd Braunecker. *Interaction effects in clean and disordered helical conductors.*

### **Lunch break (13:00-14:30)**

### Afternoon Session The role of quantum confinement and size effects in nanomaterials

Chair: Klaus Ziegler

- 14:30-15:05 Alex Zazunov. *Transport through a Coulomb blockaded Majorana nanowire.*
- 15:05-15:40 Alexander Altland. *Class D spectral peak in Majorana quantum wires.*
- 15:40-16:15 Katsuhiko Nakamura. *Poisson's equations and Bernoulli's formula for a quantum gas confined in the cavity with a moving piston.*

### **Coffee (16:15-17:00)**

### **Dinner (18:30-20:00)**



## **Day 3, October 17**

### **Morning Session Renewable energy on the basis of low-dimensional functional materials**

**Chair:** Joachim Burgdörfer

- 9:00-9:35 Giulio Casati. *Can we control the heat current? A major societal problem for the 21st century.*
- 9:35-10:10 Philippe Jacquod. *Nonlinear theory of micro- and nano-thermoelectricity.*
- 10:10-10:45 Tito E. Huber. *Photoresponse in thermoelectric bismuth nanowire arrays.*

### **Coffee Break (10:45-11:15)**

- 11:15-11:30 Sergey Maksimov, *Thermoelectric Phenomena in Small Granulated Semiconductors.*
- 11:30-12:05 Hiroshi Mizuseki. *First-principles investigation of hydrogen storage properties on metal-doped low-dimensional materials*
- 12:05-12:40 Moritz Riede. *Organic solar cells made by vacuum deposition.*
- 12:40-12:55 Nigora Turaeva. *Quantum dot shape effect on multiple exciton generation.*

### **Lunch break (13:00-14:30)**

### **Afternoon Session Renewable energy on the basis of low-dimensional functional materials**

**Chair:** Giulio Casati

- 14:30-15:05 Vladimir Dyakonov. *Nanoscale phase-separated molecular bulk-heterojunctions for photovoltaic energy conversion.*
- 15:05-15:45 Atilla Aydinli. *Si nanocrystals for third generation solar cells.*

### **Coffee Break (15:45-16:15)**

- 16:15-16:50 Vittorio Pellegrini. *Graphene for THZ detection and hydrogen storage.*
- 16:50-17:25 Vladimir Nikiforov. *Thermoelectricity in ternary rare-earth systems.*
- 17:25-18:00 Elvira Ibragimova *Electric conductivity of gamma-irradiated lithium fluoride with metal nanoparticles*

### **Dinner (18:30-20:00)**

## Day 4, October 18

### Morning Session Graphene, CNT and Fullerene

Chair: Katsuhiko Nakamura

- 9:00:-9:35 Klaus Ziegler. *Engineering of Instabilities in Graphene.*
- 9:35:-10:10 Gilles Montambaux. Dirac cones from graphene to cold atoms.
- 10:10-10:45 Alberto Tagliaferro. *Tailoring electrical properties of CNTs-polymer composites.*

### **Coffee Break (10:45-11:15)**

- 11:15-11:50 Young-Woo Son. *Physical properties of graphene systems under mechanical perturbations.*
- 11:50-12:25 Jongbae Hong. *Tunneling conductance of doped single-layer graphene and multilayer graphene.*
- 12:25-13:00 Paul May. *CVD diamond as a 21<sup>st</sup> century engineering material.*

### **Lunch break (13:00-14:30)**

### Afternoon Session Graphene, CNT and Fullerene

Chair: Reinhold Egger

- 14:30-15:05 Lucian Covaci. *Strain engineering of electronic correlations in graphene.*
- 15:05-15:40 Danilo Demarchi. *How to talk with nanothings: the micro for nano approach.*
- 15:40-16:15 Bekir Kandemir. *On the electron-phonon interactions in graphene.*

**Coffee (16:15)**

***Tour in the Tashkent city (16:30-18:30)***

**Dinner (18:30-20:00)**

## **Day 5, October 19**

### **Morning Session Quantum networks and their applications**

Chair: Alessandro De Martino

- 9:00-9:35 Leszek Sirko. *Are scattering properties of networks uniquely connected to their shapes?*
- 9:35-9:50 Valijon Eshniyozov. *Particle transport kicked graph.*
- 9:50-10:05 Jambul Yusupov. *Breathing quantum graphs.*
- 10:05-10:20 Karim Sabirov. *Nonlinear Schrodinger equation on networks.*

### **Coffee Break (10:20-10:50)**

- 10:50-11:25 Yasuhiko Hayashi. *Unusual behavior of metals confined in a low-dimensional carbon nanotube.*
- 11:25-12:00 Cristian Glattli. *Edge magneto-plasmons in graphene.*

12:00-12:35 Davron Matrasulov *Kicked Dirac particle in 1D box*

12:35-12:50 Doniyor Babajonov. *Particle transport in kicked graphene nanoribbons.*

### **Lunch break (13:00-14:30)**

### **Afternoon Session Graphene, CNT and Fullerene**

Chair: Tito Huber

- 14:30-15:05 Alessandro De Martino. *Landau levels and edge states in graphene monolayers with strong spin-orbit coupling.*
- 15:05-15:40 Ergashali Rakhimov. *Particle transport in breathing quantum billiards*
- 15:40-15:55 Khamdam Rakhimov. *Wave packet propagation in graphene with a random potential landscape*

15:55-16:15 Concluding Remarks.

### **Coffee (16:15-17:00)**

### **Banquet (18:00-20:30 )**