The Sixth International Conference
"Dynamics of Systems on the Nanoscale"

DySoN 2020

Regina Elena Hotel
Santa Margherita Ligure, Italy
November 23-27, 2020

THIRD ANNOUNCEMENT
Scope
The Sixth International Conference “Dynamics of Systems on the Nanoscale” (DySoN 2020) will take place on November 23-27, 2020 in Santa Margherita Ligure, Italy. The Conference is co-organized by the University of Ferrara (Ferrara, Italy), University of Kent (Canterbury, United Kingdom) and MBN Research Center (Frankfurt am Main, Germany).

The DySoN conference has been built upon a series of International Symposia “Atomic Cluster Collisions: structure and dynamics from the nuclear to the biological scale” (ISACC 2003-2019, see isacc-portal.org). During these meetings it has become clear that there is a need for an interdisciplinary conference covering a broader range of topics than just atomic cluster collisions, related to the Dynamics of Systems on the Nanoscale. Therefore, a new conference series was launched in 2010 under the title “Dynamics of Systems on the Nanoscale”. The first DySoN conference took place in Rome, Italy in 2010. Since then, four further DySoN conferences were held in St. Petersburg, Russia (2012); Edinburgh, United Kingdom (2014); Bad Ems, Germany (2016); and Potsdam, Germany (2018). DySoN 2020 is the sixth conference in this series.

The DySoN 2020 Conference will promote the growth and exchange of interdisciplinary scientific information on the structure formation and dynamics of animate and inanimate matter on the nanometer scale. There are many examples of complex many-body systems of micro- and nanometer scale size exhibiting unique features, properties and functions. These systems may have very different nature and origin, e.g. atomic and molecular clusters, nanostructures, ensembles of nanoparticles, nanomaterials, biomolecules, biomolecular and mesoscopic systems. A detailed understanding of the structure and dynamics of these systems on the nanoscale is a difficult and fundamental task, the solution of which is necessary in numerous applications of nano- and biotechnology, materials science and medicine.

Although mesoscopic, nano- and biomolecular systems differ in their nature and origin, a number of fundamental problems are common to all of them: What are the underlying principles of self-organization and self-assembly of matter at the micro- and nanoscale? Are these principles classical or quantum? How does function emerge at the nano- and mesoscale in systems with different origins? What criteria govern the stability of these systems? How do their properties change as a function of size and composition? How are their properties altered by their environment? Seeking answers to these questions is at the core of a new interdisciplinary field that lies at the intersection of physics, chemistry and biology, a field now entitled Meso-Bio-Nano (MBN) Science.

Experimental, theoretical and applied aspects of these problems will be discussed at DySoN 2020. Particular attention will be devoted to dynamical phenomena and many-body effects taking place in various MBN systems on the nanoscale, which include problems of structure formation, fusion and fission, collision and fragmentation, surfaces and interfaces, collective electron excitations, reactivity, nanoscale phase and morphological transitions, irradiation driven transformations of complex molecular systems, irradiation-induced biodamage, channeling phenomena, construction of novel light sources, and many more. Links of the DySoN topics to novel and emerging technologies will be an important focus of DySoN 2020.

Finally, the conference will provide a platform to host discussions about current research, technological challenges and related initiatives within the Topical Areas of DySoN Conference Series.

Topical Areas of DySoN:
- Structure and dynamics of molecules, clusters and nanoparticles
- Cluster and biomolecular ensembles, composite systems
- Clustering, self-organization, phase and morphological molecular transitions on the nanoscale
- Nanostructured materials, surfaces and interfaces
- Reactivity and nanocatalysis
- Electron and spin transport in molecular systems
- Collision and radiation processes, fusion, fission, fragmentation
- Radiation-induced chemistry
- Irradiation-driven transformations, damage and fabrication of MesoBioNano systems
- Propagation of particles through media
- Biomedical and technological applications of radiation
- Related technologies: novel light sources, controlled nanofabrication, functionalized materials, etc
**Important Dates**

- Distribution of the first announcement: November 01, 2019
- Distribution of the second announcement: April 30, 2020
- Distribution of the third announcement: July 20, 2020
- Deadline for early-bird registration: September 01, 2020
- Deadline for hotel reservation: September 15, 2020
- Deadline for abstract submission: October 01, 2020

**DySoN 2020 Program**

**Monday, November 23**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>12:00–16:00</td>
<td>Participants registration</td>
</tr>
<tr>
<td>14:00–14:15</td>
<td>DySoN 2020 Opening</td>
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<tr>
<td></td>
<td>Vincenzo Guidi, Nigel J. Mason and Andrey V. Solov'yov</td>
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<tr>
<td>14:15–15:15</td>
<td>Afternoon session I: Dynamics of systems on the nanoscale, Chair: Nigel Mason</td>
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<td></td>
<td>Andrey Solov’yov, MBN Research Center, Frankfurt am Main, Germany</td>
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<td>Rodolphe Antoine, Université de Lyon1, France</td>
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<td>Gold catenane nanoclusters: from silver doping to self-assembled nanostructures</td>
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<td>Vincenzo Guidi, University of Ferrara, Italy</td>
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<td>Two dimensional materials and their application to gas sensing</td>
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<td>15:45–16:15</td>
<td>Coffee break</td>
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<tr>
<td>16:15–18:15</td>
<td>Afternoon session II: Structure and dynamics of molecules, clusters and nanoparticles, Chair: Andrey Solov’yov</td>
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<td>Franco Gianturco, The University of Innsbruck, Austria</td>
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<td>Julius Jellinek, Argonne National Laboratory, Argonne, Illinois, USA</td>
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<td>Riccardo Ferrando, University of Genoa, Italy</td>
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<td>Wolfgang Ernst, Graz University of Technology, Graz, Austria</td>
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<td>Nanomaterials synthesized in helium droplets</td>
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<td>19:00–22:00</td>
<td>Welcome reception</td>
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**Tuesday, November 24**

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<th>Time</th>
<th>Event</th>
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<tr>
<td>9:30–11:00</td>
<td>Morning session I: Reactivity and nanocatalysis, Chair: Julius Jellinek</td>
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<td>Shiv Khanna, Virginia Commonwealth University, Richmond, USA</td>
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<td>Bridged superatomic molecules: Unusual nano p-n-junction with tunable band gaps, adjustable band alignment, and effective electron hole separation</td>
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<td>Andrew Wheatley, University of Cambridge, United Kingdom</td>
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<td>Engineering surface properties for new energy sector materials</td>
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<td>Stefan Bromley, University of Barcelona, Spain</td>
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<td>Understanding size-dependent structure and dynamics of nanoscale oxides: from water splitting to cosmic dust</td>
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<tr>
<td>11:00–11:30</td>
<td>Coffee break</td>
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<tr>
<td>11:30–13:00</td>
<td>Morning session II: Irradiation-driven processes and technologies involving Meso-Bio-Nano systems, Chair: Ilia Solov’yov</td>
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<td></td>
<td>Beata Ziaja-Motyka, Center for Free-Electron Laser Science, DESY, Hamburg, Germany</td>
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<td>Transitions in matter induced by intense X-ray radiation and their diagnostics</td>
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<td>Michael Huth, Goethe University, Frankfurt am Main, Germany</td>
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<td>Simulation-guided 3D direct-write nanofabrication with focused electron beams</td>
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**Wednesday, November 25**

### Morning session I: Propagation of particles through media, Chair: Vincenzo Guidi

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<tr>
<td>9:00 – 11:00</td>
<td><strong>Morning session I: Propagation of particles through media, Chair: Vincenzo Guidi</strong></td>
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<tr>
<td>9:00 – 10:00</td>
<td><strong>Andrei Korol</strong>, MBN Research Center, Frankfurt am Main, Germany</td>
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<td>10:00 – 10:30</td>
<td><strong>Werner Lauth</strong>, Institute of Nuclear Physics, University of Mainz, Germany</td>
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<tr>
<td>10:30 – 11:00</td>
<td><strong>Laura Bandiera</strong>, Istituto Nazionale di Fisica Nucleare, Ferrara, Italy</td>
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**Andrei Korol**: Crystal based gamma-ray light sources.

**Werner Lauth**: Characterization of crystalline undulators at the Mainz Microtron MAMI.

**Laura Bandiera**: Recent experimental results on high energy electromagnetic processes in strong crystalline fields.

### Coffee break

### 11:00 – 13:00

**Morning session II: Coherence and radiation processes in irradiated targets, Chair: Andrei Korol**

<table>
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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>11:00 – 13:00</td>
<td><strong>Silvia Ramos</strong>, University of Kent, Canterbury, United Kingdom</td>
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<td>11:30 – 12:00</td>
<td><strong>Nektarios Papadogiannis</strong>, Hellenic Mediterranean University, Heraklion, Greece</td>
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<td>12:00 – 12:30</td>
<td><strong>Vadim Ivanov</strong>, Peter the Great St. Petersburg Polytechnical University, Russia</td>
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<tr>
<td>12:30 – 13:00</td>
<td><strong>Viktor Tikhomirov</strong>, Belarusian State University, Minsk, Belarus</td>
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**Silvia Ramos**: Nanostructure probed by X-ray absorption spectroscopy.

**Nektarios Papadogiannis**: Laser-plasma secondary X-ray sources with high coherence: An important tool for spatiotemporal nanoscopy of structural changes in matter.

**Vadim Ivanov**: Channeling and radiation of electrons and positrons in straight and periodically bent diamond crystals.

**Viktor Tikhomirov**: Relativistic particle scattering by crystal planes.

### Coffee break

### 13:00 – 13:15

Conference photo

### 13:15 – 14:30

Lunch

### 14:30 – 16:00

**Afternoon session I: Design and practical realization of novel gamma-ray crystal-based light sources, Chair: Werner Lauth**

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<tr>
<th>Time</th>
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<tr>
<td>14:30 – 15:00</td>
<td><strong>Hartmut Backe</strong>, Institute of Nuclear Physics, University of Mainz, Germany</td>
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**Hartmut Backe**: Reflections on channeling of electrons in single crystals, based on experiments, simulations and the Fokker-Planck equation.
Thursday, November 26

Morning session I: Interaction of radiation with biosystems: mechanisms and applications, Chair: Thomas Schlathölter

Ilia Solov’yov, Carl von Ossietzky University, Oldenburg, Germany
Structure and dynamics of cryptochrome photoreceptors

Eugene Surdutovich, Oakland University, USA
Multiscale approach to ion-beam therapy as an idea and as an accomplishment

Martin Falk, Institute of Biophysics of the CAS, Brno, Czech Republic
DNA damage and repair in normal and tumour cells - the micro-scale and nano-scale views

Coffee break

Morning session II: Interaction of radiation with bio-nano systems: mechanisms and applications, Chair: Martin Falk

Nigel Mason, University of Kent, Canterbury, United Kingdom
Are nanoparticles a panacea for radiotherapy or a chimera?

Gérard Baldacchino, Université Paris-Saclay, Gif-sur-Yvette, France
Exposition to extreme ionizing radiations and consequences on the nanoparticles effects for therapy

Alexey Verkhovtsev, MBN Research Center, Frankfurt am Main, Germany
Computational modeling of radiosensitising nanoparticles with MBN Explorer

Alexandra Guerreiro, The Open University, Milton Keynes, United Kingdom
Comparison of the radiosensitising ability of Period 4 transition metal oxide nanoparticles

Lunch

Afternoon session I: Interaction of radiation with biomolecular systems: mechanisms and applications, Chair: Eugene Surdutovich

Thomas Schlathölter, Zernike Institute for Advanced Materials, University of Groningen, The Netherlands
Structural dynamics in DNA nanostructures observed in a free-electron-laser pump-probe experiment

Sadia Bari, Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany
Site-selective photoexcitation and dissociation of biomolecules

Hidetsugu Tsuchida, Kyoto University, Japan
Dissociation of biomolecules in liquid water by various excitation methods

Ida Friis, University of Southern Denmark, Odense, Denmark
The impact of ion-induced shock waves in biological medium

Coffee break

Afternoon session II: Radiation-induced chemistry, Chair: Ilko Bald

Kit Bowen, Johns Hopkins University, Baltimore, USA
Adventures in negative ion photoelectron spectroscopy

Hassan Abdoul-Carime, University of Lyon, France
Selective chemistry triggered by slow electrons

Béla Sulik, Institute for Nuclear Research (Atomki), Debrecen, Hungary
Ion impact ionization in gases and ices
Filipe Ferreira da Silva, Universidade Nova de Lisboa, Caparica, Portugal
Electron interactions with HFC (R134a) refrigerant gas

19:00 – 22:00 | Conference Dinner

Friday, November 27

9:00 – 11:00 | Morning session I: Dynamics of systems on the nanoscale, Chair: Alexey Verkhovtsev
Sascha Schäfer, Carl von Ossietzky University, Oldenburg, Germany
Spatio-temporal mapping of ultrafast nanoscale dynamics by femtosecond electron pulses
Ken Knappenberger, Dept. of Chemistry, Penn State University, USA
Electronic relaxation dynamics in quantum metals
Konstantin Katin, National Research Nuclear University MEPhI, Moscow, Russia
Novel nickel-based 2D materials for hydrogen storage

11:00 – 11:15 | Final Discussion and DySoN 2020 Closing

Conference Venue and Travel Information

The Conference will be hosted by Best Western Hotel Regina Elena, Lungomare Milite Ignoto 44, 40128 Santa Margherita Ligure, Italy. The hotel is located on the seashore that connects Santa Margherita Ligure to Portofino, among the Regional Natural Park and the Tigullio Gulf and the Marine Protected Area of Portofino.

Santa Margherita Ligure is a municipality in the Italian region Liguria, located about 35 kilometers southeast of Genoa, in the area traditionally known as Tigullio. The town is known for Castello di Santa Margherita Ligure, built by the Republic of Genoa in 1550 as a defense against the increasing attacks of North African pirates, as well as for Villa Durazzo - a complex that includes two patrician villas, a 16th-century castle and a 17th-century park.

The information on how to reach the conference venue can be found here. The hotel is located about 35 km away from the Genoa Airport, 150 km from the Pisa Airport and about 220 km from Milan-Malpensa and Milan-Bergamo airports. Santa Margherita Ligure train station is operated by Trenitalia, see here for prices and schedule. The venue can also be reached by car from A12 highway (exit Rapallo).

Detailed information on how to reach the conference venue will be circulated closer to the conference dates.

Financial support
A limited number of bursaries (300 Euros each) will be provided by the Sir John and Lady Mason Academic Trust for Early Career Researchers defined as Masters students doing research projects, PhD students and early postdocs (up to 3 years after PhD). Recipients of bursaries must have an abstract accepted either as oral or poster presentation. Applications should be sent to dyson.conference@gmail.com with copy of submitted abstract(s) before October 01, 2020.

Reduced registration fee (350 € (early-bird) / 400 € (late)) will be offered to the members of the Virtual Institute of Nano Films (VINF).

Best poster prize for Early Career Researchers
Thanks to one of our sponsors, Springer Verlag, we are organizing a competition for the best poster prize for Early Career Researchers. The prize will consist on both a certificate and an economic reward.
**Topical Issue of the European Physical Journal D**

A Topical Issue “Dynamics of Systems on the Nanoscale (2020)” will be launched in the *European Physical Journal D*: Atomic, Molecular, Optical and Plasma Physics. The main scope of this topical issue will be to present recent advances and perspectives in this highly interdisciplinary field of modern research. It will include regular articles, as well as review and colloquium papers.

**Submission to this Topical Issue will be opened to the entire research community** working in the DySoN topical areas and is not restricted to the participants of the DySoN 2020 Conference. All conference participants are encouraged to submit their novel results to this Topical Issue.

The deadline for submission is March 31, 2021.

Further information will be available on the conference website soon.

**Registration**

The number of rooms reserved at the hotel for conference participants is limited. We advise the participants to register for the conference and the hotel at the earliest convenience.

- Regular conference fee: 450 € (early-bird) / 500 € (late)
- Undegreeate and PhD students: 350 € (early-bird) / 400 € (late)
- Accompanying persons: 120 € (+optional 3-lunch pack for 105 €)

The conference fee will cover the book of abstracts, coffee breaks, lunches, the conference reception, a sightseeing tour and the conference dinner. The fee for accompanying persons includes the conference reception, a sightseeing tour and the conference dinner. Optionally, accompanying persons can also book a 3-lunch package for 105 € (35 € per lunch).

The payment to the order of “DySoN 2020” can be made by bank transfer to

Bank Account Name: MBN Research Center gGmbH
Bank name: Deutsche Bank
Branch Address: Hauptstr. 561462 Koenigstein Germany
IBAN: DE15500700240137588000
BIC: DEUTDEDBFRA

Please quote your NAME and DYSON on the transfer. Please ensure there are NO charges to us.

If you need an invoice for the payment or want to pay with a credit card, please send a short email to dyson.conference@gmail.com.

**Accommodation**

Please book accommodation directly with the Best Western Hotel Regina Elena and quote “DYSON” to book either (i) a single room for 55€ per night, or (ii) a double room for single use for 69€ per night, or (iii) a double/twin room for 40€ per night per person. There is also a supplement of 30€ per room per night for a double/twin room with balcony and sea view. The rooms will be reserved before September 15, 2020, and will then be released so please book early.

**Official Invitation and Visa**

Conference participants are advised to check the passport and visa requirements for travel to Italy well in advance. For invitation requests please contact Professor Vincenzo Guidi (University of Ferrara), see the contact information below.

**International Advisory Committee**

- Andrey V. Solov’yov (MBN Research Center, Frankfurt am Main, Germany) - IAC Chair
- Ilko Bald (University of Potsdam, Germany)
- Catherine Bréchignac (Laboratoire Aime Cotton, CNRS, Orsay, France)
- Michel Broyer (University of Lyon, France)
- Jean-Patrick Connerade (Imperial College London, London, UK)
- Franco Gianturco (The University of Innsbruck, Austria)
- Vincenzo Guidi (University of Ferrara, Italy)
- Julius Jellinek (Argonne National Laboratory, Argonne, Illinois, USA)
- Shiv Khanna (Virginia Commonwealth University, Richmond, USA)
• Nigel Mason (University of Kent, Canterbury, UK)
• Ilia Solov’yov (Carl von Ossietzky University, Oldenburg, Germany)
• Eugene Surdutovich (Oakland University, Rochester, Michigan, USA)

**Organizing Committee**

- Vincenzo Guidi (University of Ferrara, Italy) - **Co-Chair**
- Nigel Mason (University of Kent, United Kingdom) - **Co-Chair**
- Andrey Solov’yov (MBN Research Center, Germany) - **Co-Chair**
- Laura Bandiera (INFN, Ferrara, Italy)
- Andrei Korol (MBN Research Center, Germany)
- Andrea Mazzolari (INFN, Ferrara, Italy)
- Ilia Solov’yov (Carl von Ossietzky University, Oldenburg, Germany)
- Irina Solovyeva (MBN Research Center, Germany)
- Alexey Verkhovtsev (MBN Research Center, Germany)

**Sponsors**

The conference will be held under the auspices of the following sponsors:

- MBN Research Center, Frankfurt am Main, Germany
- University of Ferrara, Ferrara, Italy
- University of Kent, Canterbury, United Kingdom
- Sir John and Lady Mason Academic Trust
- Virtual Institute of Thin Films
- Springer Verlag
- H2020-MSCA-RISE N-Light
- H2020-MSCA-RISE RADON

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Website: www.mbnresearch.com

**DySoN Conference Web Page**

Updated information on the conference series is available at [www.dyson-conference.org](http://www.dyson-conference.org)

**Conference e-mail**

dyson.conference@gmail.com