

International School of Solid State Physics  
(director: Prof. G. Benedek)

88<sup>th</sup> course: Epioptics-17 & Xenex-5

Directors: A. Cricenti, A. Molle  
Erice (IT), July 6-12, 2024

## SCIENTIFIC PROGRAM

Lecture Hall John von Neumann, Patrick M.S. Blackett Institute (San Domenico)

### Saturday July 6th

19:30-21:30

*Dinner in affiliated restaurant*

21.30

**Meet up at the Marsala Room in I.I. Rabi Institute (San Rocco)**

### Sunday July 7<sup>th</sup>

**09:00-12:50**

**Morning Session**, Chairs: *Alessandro Molle, Antonio Cricenti*

09:00-09:20

*Antonio Cricenti*  
*Alessandro Molle*

Opening of the school: Welcome to Erice

09.20-10.00

*Friedhelm Bechstedt*

Ab-initio description of optical properties of bulk, layers, surfaces and nanostructures (1)

10.00-10.40

*Athanasios Dimoulas*

Epitaxial 2D materials with non-trivial topology (1)

10:40-11:00

*Ygit Sozen*

Massive parallel mechanical exfoliation: a scalable and low-cost production method for few-layer 2D materials

**11:00-11:20**

**Coffee break (Poster Mounting)**

11:20-12:05

*Harold Zandvliet*

Germanene: a monoelemental 2D topological insulator

12.05-12.50

*Yves Borensztein*

Multi-technique study of some Xenex films: growth, structure, reactivity and optical properties

**13:00**

**Lunch (affiliated restaurants)**

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**16:00 – 19:50**

**Evening Session, Chairs: Yves Borensztein, Harold Zandvliet**

16:00-16:45 *Christoph Cobet*

In-situ polarization optics in electrochemistry

16:45-17:30 *Francesco Bisio*

Ellipsometry spectroscopy of low-dimensional materials

**17:30 - 17:45**

**Coffee break (Poster mounting)**

17:45-18:25 *Friedhelm Bechstedt*

Ab-initio description of optical properties of bulk, layers, surfaces and nanostructures (2)

18:25-19.05 *Athanasios Dimoulas*

Epitaxial 2D materials with non-trivial topology (2)

19:05-19:50 *Olivia Pulci*

Electronic and optical properties of 2-D materials: effect of gating, twisting, and of the substrate.

**20:00**

***Dinner (selected restaurants)***

**21.30**

***Meet up at the Marsala Room in I.I. Rabi Institute (San Rocco)***

**Monday July 8th**

**09:00 - 13:00**                      **Morning Session**, Chairs: *Athanasios Dimoulas, Friedhelm Bechstedt*

- |             |                         |  |
|-------------|-------------------------|--|
| 09:00-09:40 | <i>Juan Sierra</i>      | Spintronics and thermoelectrics based on 2d van der Waals Heterostructures (1)   |
| 09:40-10:20 | <i>Doron Naveh</i>      | Optoelectronics based on 2D materials (1)  |
| 10:20-10:40 | <i>Julian Plaickner</i> | Synchrotron-based VUV ellipsometry on passivated Si samples and Al <sub>2</sub> O <sub>3</sub> for optical thin film metrology |
| 10:40-11:00 | <i>Esteban Zamora</i>   | Roll-to-Roll Exfoliation for Anisotropic Films of 2D Materials   |

**11:00 - 11:30**                      **Coffee break & Poster session**

- |             |                                     |   |
|-------------|-------------------------------------|---|
| 11:30-12:15 | <i>Francesco Buatier de Mongeot</i> | Nanopatterning 2D semiconducting layers for large-scale photon harvesting and nanoelectronics |
| 12:15-13:00 | <i>Kenan Gundogdu</i>               | Room Temperature Superfluorescence in Perovskites and Its Implications for Quantum Materials  |

**13:00**                                      **Lunch (affiliated restaurants)**

**16:00 - 19:50.**    **Evening Session**, Chairs: *Francesco Buatier de Mongeot, Kenan Gundogdu*

- |             |                       |  |
|-------------|-----------------------|--|
| 16:00-16:45 | <i>Luis Mochan</i>    | Homogenization of multicomponent metamaterials |
| 16:45-17:30 | <i>Kjeld Pedersen</i> | Optical properties of metallic nanowires.      |

**17:30-18:00**                      **Coffee break and Poster Session**

- |             |                         |  |
|-------------|-------------------------|--|
| 18:00-18:40 | <i>Juan Sierra</i>      | Spintronics and thermoelectrics based on 2d van der Waals Heterostructures (2) |
| 18:40-19:20 | <i>Doron Naveh</i>      | Optoelectronics based on 2D materials (2)                                      |
| 19:20-19:50 | <i>Antonio Cricenti</i> | Optical nanospectroscopy for bioanalysis                                       |

**20:00**

**Dinner**

**21.30**

**Meet up at the Marsala Room in I.I. Rabi Institute (San Rocco)**

**Tuesday July 9th**

**09:00 - 12:45**    **Morning Session**, Chairs: *Doron Naveh, Luis Mochan, Kjeld Pedersen*

09.00-09.40	<i>Cinzia Casiraghi</i>	Overview on 2D Material-based Inks: from Fundamentals of Colloidal Chemistry to Applications (1)
09:40-10:20	<i>Sang-Hoon Bae</i>	Fabrication of van der Waals stacks (1)
10:20-10:40	<i>Simone Grillo</i>	Tunable Second Harmonic Generation in 2D Materials from First-Principles
10:40-11:00	<i>Renebeth Payod</i>	Analysis of the Absorption Resonances between Carbynes and Cyclo[n]carbons: a tight-binding approach
<b>11:00-11:30</b>	<b>Coffee break &amp; Poster Session</b>	
11:30-12:15	<i>Luca Vattuone</i>	Experimental observations of the acoustic surface plasmon: from Electron Energy Loss Spectroscopy to Hyperthermal atom scattering
12:15-13:00	<i>Christoph Tegenkamp</i>	Proximity coupling effects in epitaxial 2D graphene-based systems
<b>13:00</b>	<b>Lunch (affiliated restaurants)</b>	
<b>16:00 - 19:40</b>	<b>Evening Session, Chairs: <i>Christoph Tegenkamp, Juan Sierra</i></b>	
16:00-16:45	<i>Vyacheslav Silkin</i>	Low-energy collective electronic excitations at metal surfaces and layered materials
16:45-17:30	<i>Carmen Munuera</i>	Strain engineering of 2d materials
<b>17:30-18:00</b>	<b>Coffee break &amp; Poster Session</b>	
18:00-18:40	<i>Cinzia Casiraghi</i>	Overview on 2D Material-based Inks: from Fundamentals of Colloidal Chemistry to Applications (2)
18.40-19.20	<i>Sang-Hoon Bae</i>	Fabrication of van der Waals stacks (2)
19:20-19:40	<i>Domenico Corona</i>	Self-consistent Hubbard parameters in doped layered transition-metal oxides for sodium-ion batteries
<b>20:00</b>	<b>Dinner</b>	
<b>21.30</b>	<b>Meet up at the Marsala Room in I.I. Rabi Institute (San Rocco)</b>	

**Wednesday July 10th**

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**09:00 – 13:00**

**Morning Session**, Chairs: *Dietrich Zahn, Carmen Munuera*

- 09.00-09.45 *Junji Yuhara* Growth of group 14 elemental post-graphene materials  
09:45-10:30 *Jonhathan Bradford* Molecular Beam Epitaxy of 2D Materials for Deep-UV Optoelectronics

**10:30-11:00**

**Coffee break & Poster Session**

- 11:30-12:15 *Zdenek Sofer* 2d silicon, germanium, and pnictogenes by chemical methods  
12:15-13:00 *Alessio Lamperti* Strategies for tuning the CVD synthesis of 2D transition metal dichalcogenides in a hot-wall tube reactor

**13:00**

**Lunch (affiliated restaurants)**

**15:00** *Excursion to Segesta or Selinunte or Mothia, take with you solar cream, cap, water, snacks*

**20:00** *Social Dinner*

**Thursday July 11th**

**09:00 – 13:00**                      **Morning Session, Chairs: Cinzia Casiraghi, Norbert Esser**

09:00-09:45    *Mark Hersam*                      Mixed-Dimensional Heterostructures for Electronic and Energy Technologies

09:45-10:30    *Aldo Di Carlo*                      MXenes and other two-dimensional materials in new generation photovoltaics

**10:30-11:00**                      **Coffee break & Poster Session**

11:00-11.45    *Christoph Gadermeier*                      Ultra-fast spectroscopy of 2d materials

11:45-12:30    *Norman Tolk*                      Point defect and proximal interface induced modification of Er<sup>3+</sup> optical transitions in single crystal Er<sub>2</sub>O<sub>3</sub>

**13:00**                                      **Lunch (affiliated restaurants)**

**16:00 - 19:45**                      **Evening Session, Chairs: Christoph Gadermeier, Olivia Pulci**

16:00-16:45    *Norbert Esser*                      Raman Spectroscopy at Surfaces and 2D Metallic Layers

16:45-17:30    *Dietrich Zahn*                      Plasmon-enhanced Raman Spectroscopy of Low-dimensional Semiconductors

**17:30-17:50**                      **Coffee break**


17:50-18:35    *James Ingham*                      The application of artificial intelligence and machine learning to the analysis of spectral images

18.35-19.05    *Alessandro Molle*                      Xenex: from growth to applications

19:05-19:45    *Antonio Cricenti, Alessandro Molle*                      **Young Researcher Award and Closing Remarks**

**20:00**                                      **Dinner**

**21.30**                                      **Meet up at the Marsala Room in I.I. Rabi Institute (San Rocco)**



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**Friday July 12<sup>th</sup> : Departure (check your schedule time at San Rocco hall)**

*Antonio Cricenti & Alessandro Molle  
Directors of the Workshops*

*Giorgio Benedek  
Director of the School*

*Antonino Zichichi  
EMFSSC President*