



10th International Conference **UNSOLVED PROBLEMS ON NOISE**

September 8-11, 2026

Messina, Italy



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10th International Conference on Unsolved Problem on Noise
UPoN 2026
8-11 September 2026, Messina, Italy

TECHNICAL PROGRAM





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TECHNICAL AREA CHAIRS

Noise in biology and in biomedicine: Peter Mc Clintock, Lancaster University, UK.

Noise in materials and devices: Bruno Sagnes, University of Montpellier, France.

Noise in circuits: Jean-Guy Tartarin, University of Toulouse, France.

Noise in quantum devices and systems: Elisabetta Paladino, University of Catania, Italy.

Acoustic and mechanical noise: Vincenzo Dattilo, European Gravitational Observatory, Italy.

Noise in human activities and application of noise: Christiana Chamon Garcia, Virginia Tech, USA.

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Bruno Sagnes, University of Montpellier, France.



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Elisabetta Paladino, University of Catania, Italy.

Nicole Fabbri, LENS - European Laboratory for Non-Linear Spectroscopy, Italy.

Jean-Guy Tartarin, University of Toulouse, France.

Vincenzo Dattilo, European Gravitational Observatory, Italy.

Christiana Chamon Garcia, Virginia Tech, USA.

Laszlo Kish, Texas A&M University, USA.

Janusz Smulko, Gdańsk University of Technology, Poland.



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UPON 2026 KEYNOTE SPEAKERS

KEYNOTE LECTURE: SEPTEMBER 8, H 9:00



The beneficial role of noise: stochastic resonance and beyond

Luca Gammaitoni,
Department of Physics and Geology
University of Perugia
Perugia, Italy

ABSTRACT

The phenomenon of Stochastic Resonance has become the hallmark of a whole new wave in the discussion of stochastic nonlinear physical systems, in which the role of noise and fluctuations can have beneficial effects, if certain conditions are met. In this seminar, we will briefly review Stochastic Resonance and introduce new phenomena in which the role of noise is producing benefits far beyond what is normally expected.



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KEYNOTE LECTURE: SEPTEMBER 9, H 9:00



Spin noise and diamond spin qubits

Fedor **Jelezko**,
Institute of Quantum Optics,
Ulm University

ABSTRACT

Diamond spin qubits are attracting increasing attention due to their potential applications in quantum information processing and sensing. In this talk, we will discuss the role of quantum projection noise in quantum sensing, and its impact on the sensitivity and frequency resolution of diamond colour centres as quantum magnetometers. We will also explore the detection of nuclear magnetic resonance (NMR) signals at the nanoscale using quantum sensors, where spin noise acts as the signal.



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KEYNOTE LECTURE: SEPTEMBER 9, H 11:10



Quantum Computing Devices

Giuseppe A. Falci,
Department of Physics and Astronomy
“E. Majorana”, Università di Catania,
Italy

ABSTRACT

In standard quantum mechanics, physical systems are often idealized as isolated entities evolving under unitary dynamics. In practice, however, unavoidable interactions with environmental degrees of freedom lead to decoherence, limiting the performance of quantum technologies. In quantum computing, decoherence manifests as errors that hinder the realization of the expected computational advantage, low-frequency noise being the major source of degradation in solid-state quantum platforms.

In this talk, I review the main approaches to addressing decoherence induced by broadband colored noise, using superconducting quantum devices as a case study. I discuss diagnostic tools for identifying decoherence mechanisms and outline the main strategies for their mitigation. Open problems—such as the detection of non-Gaussian noise features, their effects in multilevel and multi-qubit systems, and the development of a comprehensive theory of quantum $1/f$ noise—are also addressed.



KEYNOTE LECTURE: SEPTEMBER 10, H 9:00



**Computing at kT: A Stochastic
Thermodynamics Perspective**

Massimiliano Esposito,
University of Luxembourg,
Luxembourg

ABSTRACT

As electronic devices operate increasingly close to the thermal energy scale kT , fluctuations become an intrinsic component of their dynamics rather than a perturbation. In this regime, computation must be understood as a nonequilibrium physical process.

In this talk, I will show how stochastic thermodynamics provides a consistent framework to describe nonlinear electronic circuits in the presence of noise, with a focus on subthreshold CMOS technologies. By enforcing thermodynamic consistency at the level of stochastic dynamics, this approach allows one to characterize energy exchanges, dissipation, and fluctuations in computational devices.

I will discuss how this perspective naturally leads to probabilistic computing elements that exploit thermal noise, and argue that stochastic thermodynamics offers a principled way to think about computation in energy-limited, noisy regimes.

PROGRAM SCHEDULE - TUESDAY, SEPTEMBER 8

8:00-8:45	Registration (open until 5:20 pm)
8:45-9:00	Conference Opening
Keynote Speaker:	
9:00-10:00	Luca Gammitoni: <i>The beneficial role of noise: stochastic resonance and beyond</i> Session chair: TBD
10:00-10:50	Session: Theory of noise and fluctuations Session Chair:
10:00-10:30	TBD
10:30-10:50	Blackbody Photon-Number Fluctuations as a New Paradigm for the Fine-Structure Constant: From Subatomic to Cosmological Scales <i>L. Varani, F. Intini, L. Reggiani, and Felipe da S. Alves</i>
10:50-11:20	Coffee break
11:20-13:00	Visit to the Astronomical Clock (Basilica Cattedrale "Santa Maria Assunta", very close to the conference venue)
13:00-14:30	Lunch



Basilica Cattedrale "Santa Maria Assunta"

PROGRAM SCHEDULE - TUESDAY, SEPTEMBER 8

14:30-16:10	Session: Fluctuations and noise in materials and devices 1 Session Chair: <i>Bruno Sagnes</i>
14:30-14:50	Reducing the low-frequency noise of graphene resistors by gold nanoparticle deposition. <i>K. Drozdowska-Czubek, J. Smulko</i>
14:50-15:10	Non-Gaussian Ambient Light Cancellation Overflow Noise in Wrist and Finger Photoplethysmography: A Statistical Characterization using the MAX30102 Sensor. <i>R. Rahman, F. Mahzabeen</i>
15:10-15:30	Low-Frequency Noise and Temperature Resolution in Amorphous Silicon p-i-n Sensors. <i>G. Giusi, G. Scandurra, F. Cappelli, D. Caputo, G. Petrucci, C. Ciofi</i>
15:30-15:50	Noise Analysis of micrometer-scale Vanadium Dioxide Resistors for Temperature Sensing. <i>G. Brandsteert, T. Ratier, L. Lahaye, V. Kilchytska, B. Reulet, D. Flandre, L. Van Brandt</i>
15:50-16:10	Experimental studies of Charge-Density-Wave in 1T-TaS ₂ ink-printed devices at elevated temperatures. <i>J. Smulko</i>
16:10-16:40	Coffee break
16:40-17:20	Session: Fluctuations and noise in materials and devices 2 Session Chair: <i>Bruno Sagnes</i>
16:40-17:00	1/f noise in the nonlinear coefficients of dc- and ac-biased tunnel junctions. <i>N. Fontaine, B. Reulet</i>
17:00-17:20	Noise Spectroscopy of beta-Ga ₂ O ₃ Epitaxial Layers Grown on Sapphire Substrate. <i>S. Pralgauskaitė, K. Gudeliauskas, J. Glemža, J. Matukas, J. Jorudas, S. Indrišiūnas, P. Gečys, P. Kašalynas, C. Huang, R. Horng</i>
17:20-18:45	Free time

18:45-19:15 **Transfer to Teatro Vittorio Emanuele**

19:30-22:00 **Piano recital & Welcome Coctail**



Teatro Vittorio Emanuele

PROGRAM SCHEDULE - WEDNESDAY, SEPTEMBER 9

8:30-9:00	Registration (open until 14:20)
	Keynote Speaker:
9:00-10:00	Fedor Jelezko: <i>Spin noise and diamond spin qubits</i> Session chairs: TBD
10:00-10:40	Special Session: Quantum Sensing Session Chair:
10:00-10:20	Machine-Learning-Assisted Quantum Sensing of Noise Correlations. <i>L. Giannelli, S. Mukherjee, D. Fasone, E. Paladino, G. Falci</i>
10:20-10:40	Magnetic sensing and imaging with NV centers in diamond. <i>S. Hernandez Gomez</i>
10:40-11:10	Coffee break
	Kenote Speaker:
11:10-12:10	Giuseppe Falci: <i>Decoherence and 1/f noise in Quantum Nanoscience: Superconducting Quantum Computing Devices.</i> Session chair: TBD
12:10-12:50	Session: Noise in nano-scaled and quantum devices and systems Session Chair: Elisabetta Paladino?
12:10-12:30	Noise-driven ionic transport in single-walled carbon nanotubes. <i>D. Luchinsky, P. McClintock, W. Gibby, I. Khovanov</i>
12:30-12:50	Approximate model of phase noise in qubit control pulses. <i>A. Barsotti, M. Macucci</i>

PROGRAM SCHEDULE - WEDNESDAY, SEPTEMBER 9

12:50-14:20	Lunch
14:20-15:30	Free time
15:30-16:30	Transfer to Horecynus Orca (by bus provided by the Organization)
16:30-17:40	Session: Noise in biology and in biomedicine 1 Session Chair: <i>Peter McClintock</i>
16:30-17:00	Statistical fluctuations of large-scale mind states. (Invited) <i>D. Chialvo</i>
17:00-17:20	Biological Noise as a Therapeutic Tool: A Novel Platform based on the Constrained Disorder Principle <i>Y. Ilan</i>
17:20-17:40	Analysis of Repetitive Handwriting by Using the Multifractal Spectrum. <i>M. Uchida</i>
17:40-18:15	Round Table: Evolution of Research on Noise Panelists: <i>D. Abbott, L.Kish, P. McClintock</i>
18:15-19:15	Round Table will continue during Sicilian Ice Cream Tasting!



Stretto di Messina

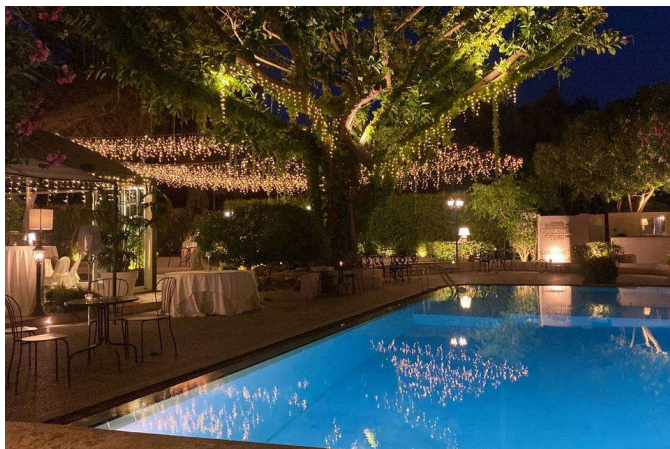
PROGRAM SCHEDULE - THURSDAY, SEPTEMBER 10

8:30-9:00	Registration (open until 18:30)
	Keynote Speaker:
9:00-10:00	Massimiliano Esposito: <i>Computing at kT: A Stochastic Thermodynamics Perspective</i> Session Chair: TBD
10:00-10:50	Special Session 1: Stochastic Thermodynamics 1 Session Chair: <i>Leopold Van Brandt</i>
10:00-10:30	Higher order moments of entropy production and consequences for electronic devices. (Invited) <i>J. Delvenne</i>
10:30-10:50	Fluctuations of integrated currents and timing observables for dissipation inference in Markov jump processes. <i>A. Garilli</i>
10:50-11:20	Coffee break
11:20-12:20	Special Session 1: Stochastic Thermodynamics 1 Session Chair: <i>Leopold Van Brandt</i>
11:20-11:40	Stochastic thermodynamics and predictability of Ornstein–Uhlenbeck processes: application to the Madden–Julian Oscillation. <i>R. Benincasa, J.B. Weiss, D. Du, G. S. Duane</i>
11:40-12:00	Taming nonequilibrium thermal fluctuations in subthreshold CMOS circuits. <i>J. Freitas</i>
11:20-12:20	Energy statistics in two-qubit solid-state system. <i>Z. Rashid, S. Hernández Gómez, S. Gherardini, N. Fabbri</i>
12:20-13:00	Session: Noise in biology and in biomedicine 2 Session Chair: <i>Peter McClintock</i>
12:20-12:40	Effects of Screen Conditions and 20 Hz Band-Pass Filtering on Gaze Discrimination in SSVEP-Based BCIs. <i>H. Gyobu, T. Mizuno, N. Itakura, S. Matsuno, S. Ogo, S. Tanaka</i>

12:40-13:00	Theoretical Foundation and Validation of R-B Color Difference for Robust Hemodynamic Assessment in Actual Images. <i>M. Shimizu, N. Itakura, K. Mito, T. Mizuno</i>
13:00-14:30	Lunch
14:30-15:50	Session: Noise in biology and in biomedicine 3 Session Chair: <i>Peter McClintock</i>
14:30-14:50	Local Spatial Patterns of Hemodynamic Fluctuations in Near-Infrared Face Images Under Acute Stress. <i>E. Gono, K. Nagumo, A. Nozawa</i>
14:50-15:10	Toward Human Motor Control State Discrimination in Rhythmic Movements from Short-Time Fluctuation Characteristics Using Neural Networks. <i>K. Nagumo, A. Nozawa</i>
15:10-15:30	Rare Deep-Brain Stimulation Pulse Trains from Purely High-Frequency Harmonics. <i>L. Kish, S. M. Bezrukov, L. Kovács</i>
15:30-15:50	ECG, PPG, and Elite HRV based HHR determination on a treadmill test. <i>M. Huotari</i>
15:50-16:50	Session: Noise in human activities 1 Session Chair: <i>Christiana Chamon Garcia</i>
15:50-16:20	Ultradian Organization of the Human Physical Activity. (Invited) <i>A. Dér</i>
16:20-16:40	High Frequency Attack Against the KLJN Secure Key Exchange Scheme. (Invited) <i>L. Kish, K. Entesari</i>
16:50-17:20	Coffee Break
17:20-18:20	Session: Noise in human activities 2 Session Chairs: <i>Christiana Chamon Garcia, Laszlo Kish</i>
17:20-17:40	Two Factor Authentication with PPG and Voice Input Leveraging Hidden Markov Model. <i>S. Saif, M. Karamat, C. Garcia</i>
17:40-18:00	Above and Beyond the Daily Rhythm: How Can We Examine the Fluctuations in Our Everyday Motion? <i>B. Maczák, C. Nagy, G. Skrionya, A. Hock, C. G. Horváth, R. Bódizs, G. Vadai</i>
18:00-18:20	Noiseprint: Toward Robust Image Classification via Intrinsic Sensor Noise Signatures <i>C. Garcia</i>
18:20-19:30	Free time

19:30-20:30	Transfer to the gala dinner venue (Villa Ida)
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20:30-22:30	Gala Dinner (Villa Ida)
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Villa Ida

PROGRAM SCHEDULE - FRIDAY, SEPTEMBER 11

9:00-10:10	Special Session: Noise in Gravitational-Wave Detectors: Sources, Mitigation, and Open Problems Session Chair:
9:00-9:30	Optical electronics and environmental noises that affect the stability performances and reliability of the laser injection of Virgo. (Invited) <i>P. Lagabbe</i>
9:30-9:50	Environmental Noise Coupling in Virgo Gravitational-Wave Detector: Magnetic Measurements and Acoustic Simulations. <i>L. Lunghini, I. Fiori, M. Punturo, M.C. Tringali</i>
9:50-10:10	Bias from Noise Idealization in Null Stream Searches for Non Tensorial Gravitational Wave Polarizations. <i>B. Cirok, I.C.F. Wong, G. Vadai</i>
10:10-10:40	TBD
10:40-11:10	Coffee break
11:10-12:40	Session: Noise in circuits Session Chair: <i>Jean-Guy Tartarin, Matthias Rudolph</i>
11:10-11:40	GaN-based Low-Noise Amplifiers: A review. (Invited) <i>M. Rudolph</i>
11:10-11:30	Self-reconfigurable GaN LNA: a game changer for next generation of robust RF receivers. <i>J.G. Tartarin</i>
11:10-11:30	Stochastic port-Hamiltonian modeling of electrical networks out of equilibrium. <i>M. Bonnin, L. Desoppi, L. Van Brandt, J. Delvenne, B. Reulet, F. Bonani, F. Traversa</i>
11:10-11:30	A Reactive Capacitive Variant of the Kirchhoff-Law-Johnson-Noise (KLJN) Secure Key Exchange Scheme. <i>C. Garcia, S. Ferdous, L. Kish</i>
12:40-13:00	Conference closing
13:00-14:30	Lunch

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