

# **RIUNIONE ANNUALE 2015 – L’Aquila, 17-19 Giugno 2015**

## **Programma Dettagliato**

### **Mercoledì 17 Giugno 2015 (Auditorium del Parco)**

**Registrazione (11:30-12:30, Auditorium del Parco)**

**Brunch (12:30-13:30, Auditorium - Foyer)**

**Saluti di benvenuto: Prof.ssa Paola Inverardi, Rettrice (13:30-14.00, Auditorium – Main Hall)**

**Lo Stato del Sistema Accademico e della Ricerca (14:00-16:00, Auditorium – Main Hall)**

**Interventi di:**

- **prof. Antonio Vicino (Rappresentante dei professori ordinari, area 09, CUN)**  
*"Il sistema universitario: prospettive di evoluzione o rischio di declino?"* [pdf]
- **prof.ssa Paola Inverardi (Rettrice Università dell'Aquila, CRUI)**  
*"L'Università tra competizione, ruolo nel territorio e accesso alle risorse"*
- **prof. Mario Calderini (Politecnico di Milano, Consigliere per le politiche della ricerca e dell'innovazione MIUR)**  
*"Il nuovo Programma Nazionale della Ricerca"*

**Discussione moderata da:**

- **prof. Marco Ajmone Marsan (Politecnico di Torino)**

**Coffee break (16:00-16:30, Auditorium - Foyer)**

## **Sessione didattica, (16:30-18:30, Auditorium – Main Hall)**

**(Coordinamento Prof. Francesco De Natale)**

### **Interventi di:**

- **16:30-16:45 prof. Francesco De Natale (Università di Trento, GTTI) e Prof. Daniele Riccio (Università di Napoli “Federico II”, SIEM)**  
*"Note introduttive: quale futuro per la didattica delle telecomunicazioni e dell'elettromagnetismo?"*  
*Argomento: Introduzione ai temi della sessione e risultati dell'analisi preliminare sull'offerta trasversale in ambito tlc e elettromagnetismo*
- **16:45-17:00 prof. Arnaldo Spalvieri (Politecnico di Milano, GTTI)**  
*"Contenuti trasversali delle telecomunicazioni" [pdf]*  
*Argomento: Un syllabus delle competenze "tlc" indispensabili per un professionista dell'ICT e per un ingegnere in generale*
- **17:00-17:15 prof. Fabio Lavagetto (Università di Genova, GTTI)**  
*"Telecomunicazioni oltre l'ICT"*  
*Argomento: Le telecomunicazioni nei profili interdisciplinari dell'offerta formativa in Area 09 e in altre aree scientifiche: esperienza, strategie e prospettive all'Università di Genova*
- **17:15-17:30 prof. Andrea Bianco (Politecnico di Torino, GTTI)**  
*"Progetti didattici innovativi e fortemente interdisciplinari" [ppt]*  
*Argomento: Master in "ICT for Smart Societies" al PoliTO*
- **17:30-17:45 prof. Daniele Riccio (Università di Napoli “Federico II”, SIEM)**  
*"Campi Elettromagnetici alla laurea triennale: alcuni perché, e qualche come" [pdf]*
- **17:45-18:30 Tavola rotonda e discussione**  
Partecipanti: *Prof. A. Vicino (CUN), Prof. F. De Natale, Prof. D. Riccio, Prof. A. Spalvieri, Prof. F. Lavagetto, Prof. A. Bianco*

*Argomento: Prospettive di apertura interdisciplinare del settore TLC e EM: ipotesi e obiettivi concreti per una nuova fase della didattica collegata*

- **18.30 Chiusura sessione**

**Concerto e rinfresco (19:30 – 22:30, Auditorium)**

**Giovedì 18 Giugno 2015 (UnivAQ – Dip. Scienze Umane)**

**Registrazione (08:00-18:00, c/o ingresso Aula Magna)**

**Invited Talks on Research Advances in Telecommunications (8:30-10:45, Aula Magna)**  
(coordinamento: prof. Marco Chiani, Università di Bologna)

**Interventi di:**

- **Dr. Marco Di Renzo, *Supélec, Paris***

*"Computational Stochastic Geometry: The Magic of Stochastic Geometry at a Low Complexity – Mathematical Modeling and Experimental Validation for Application to 5G Cellular Networks"*

**Abstract**

*The fifth-generation (5G) is coming. Quo vadis 5G? What architectures, network topologies and technologies will define 5G? Are the methodologies to the analysis, design and optimization of current cellular networks still applicable to 5G? This talk is aimed to discuss the critical and essential importance of spatial models for an accurate system-level analysis and optimization of emerging 5G ultra-dense and heterogeneous cellular networks, which are expected to rely on a much denser deployment of access points, to a scale that has never been observed in the past. Due to the increased heterogeneity and deployment density, in particular, new flexible and scalable approaches for modeling, simulating, analyzing and optimizing cellular networks are needed. Recently, a new approach has been proposed: it is based on the theory of point processes and it leverages tools from stochastic geometry for tractable system-level modeling, performance evaluation and optimization. In this talk, we investigate the accuracy of this emerging abstraction for modeling cellular networks, by explicitly taking*

*realistic base station locations, building footprints, spatial blockages and antenna radiation patterns into account. More specifically, the base station locations and the building footprints are taken from two publicly available databases from the United Kingdom. Our study confirms that an abstraction model based on stochastic geometry is capable of accurately modeling the communication performance of cellular networks in dense urban environments. Time permitting, the audience will be introduced to the concept of computational stochastic geometry and to how the mathematical potential of stochastic geometry can be leveraged to an affordable computational complexity, yet retaining its accuracy and capability of modeling practical 5G communication networks. The potential of stochastic geometry for modeling and analyzing cellular networks will be investigated for application to several emerging case studies, including massive MIMO, mmWave communication, and wireless power transfer.*

- **Prof. Hamid Jafarkhani, UC Irvine, DL IEEE COMSOC**

*“Cooperative communications and distributed beamforming in wireless networks” [pdf]*

**Abstract**

*We present a general description of current wireless communication technologies. We argue the need for cooperative wireless networks and discuss the existing methodologies. We present the distributed nature of the network and the distributed beamforming methods that use full channel state information. Then, we address the role of quantized feedback in relay networks. Finally, we discuss the effects of interference in wireless relay networks and the design of quantized feedback in wireless relay-interference networks.*

- **Prof. Luiz A. DaSilva, Trinity College Dublin, DL IEEE COMSOC**

*"Dynamic Spectrum Access and the Role of Game Theory" [pdf]*

**Abstract**

*The past fifteen years have witnessed a surge in research on dynamic spectrum access (DSA) as a way to achieve efficiencies in the use of electromagnetic spectrum. From early on, game theory was applied to the analysis and design of DSA, building incentive mechanisms for spectrum sharing and understanding what outcomes are likely with and without coordination among networks that need to coexist in shared spectrum. This talk will review some fundamental game theoretic concepts and discuss their application to DSA and cognitive networks. We will discuss recent work on coalition formation games among parties interested in sharing spectrum and games that allow us to investigate the impact of imperfect information on distributed, autonomous decision making on spectrum use.*

**Coffee break (10:45-11:15, Terrazzo – primo piano)**

## PhD candidates' ongoing research

(coordinamento: Prof. Fabio Graziosi, Università dell'Aquila)

- Introduzione alla sessione (11:15-11:35, Aula Magna) [pdf]
- Presentazione poster da parte dei dottorandi (11:35-12:30, Atrio e aule – primo piano)

Lunch (12:30-13:15, Terrazzo – primo piano)

## 2015 Best GTTI PhD Awards (13:15-14:45, Aula Magna)

(coordinamento: prof. Roberto Cusani, La Sapienza Università di Roma)

- **Dr. Stefania Bartoletti**, “*Wireless Localization Systems: Statistical Modeling and Algorithm Design*”, Dottorato di Ricerca conseguito presso l’Università degli Studi di Ferrara, Tutor: A. Conti
- **Dr. Guido Carlo Ferrante**, “*Sagomatura dell’Interferenza verso un’ottimizzazione degli interferenti di ricetrasmisione*”, Dottorato di Ricerca conseguito presso l’Università degli Studi di Roma “La Sapienza”, Tutor: G. Di Benedetto [pdf]
- **Dr. Marco Fontani**, “*Digital Forensic Techniques for Splicing Detection in Multimedia Content*”, Dottorato di Ricerca conseguito presso l’Università degli Studi di Siena, Tutor: M. Barni [pdf]

## Plenary talks (14:45-16:00, Aula Magna)

- **Prof. Massimo Franceschetti, UCSD**

**Keynote speech:** “*Information, Electromagnetics, and the Dimensionality of the Universe*” [pps]

**Abstract**

How much information can be carried by electromagnetic radiation? We present a variation of a theorem of Landau concerning the phase transition of the eigenvalues of a time-frequency limiting operator, and describe its application in a limiting regime where the original

theorem cannot be directly applied. Using this result, we compute the number of degrees of freedom of square-integrable fields in terms of Kolmogorov's N-width and determine, up to order, the total amount of information that can be transported in time and space by electromagnetic waves, extending previous single-frequency treatments to signals of non-zero frequency bandwidth. In closing, we also discuss how these mathematical results are related to the holographic principle of quantum gravity that has been formulated in the context of black hole thermodynamics.

- **Prof. Roberto Battiston, Presidente ASI**  
*"A Space renaissance"*

### **Assemblea e Consiglio Direttivo Scientifico GTTI (16:30-18:30, Aula Magna)**

- **Relazioni Presidente, Segretario, Tesoriere**
- **Rinnovo delle cariche nuovo triennio 2015-2018**

### **Assemblea GTTI (18:30 - 19:00, Aula Magna)**

- **Approvazione di bilancio**

### **Assemblea degli afferenti CNIT (17:00 - 18:30, Aula 1A)**

### **Visita guidata alla città (19:00 - 20:15)**

### **Cena sociale (20.30-22:30, Magione Papale Ristorante&Relais) con conferimento dei premi GTTI/CNIT**

# Venerdì 19 Giugno 2015 (UnivAQ – Dip. Scienze Umane)

**Registrazione (08:00-12:00, c/o ingresso Aula Magna)**

**Interventi aziende (08:30-10:30, Aula Magna)**

- **Ing. Gianni Guidotti, CTO Security & Information Systems division - Selex ES – a Finmeccanica company**

*“Communications and Security issues in the protection of Citizens and Critical Infrastructures”* [pdf]

**Abstract**

By 2050 Cities will cover 3% of Earth, consuming 75% of resources and producing 70% of CO<sub>2</sub>. One of the most relevant issues is the protection of Citizens and of Critical Infrastructures which “feed” the cities and connect and move people and goods.

The presentation will focus on some specific technologies and applications, as secure and reliable communications, localization and navigation, secure networks and IT/Data services. Security and reliability problems arise from communications based on heterogeneous public and private access technologies, from network elements virtualization, from a fully interconnected world. Technologies for these applications are rapidly evolving, and contributions from Universities and Research Centers will be essential for the evolution, and highly appreciated by industries.

- **Dr. Sergio Galbiati, LFoundry**

*“Critical role for Europe of an advanced silicon foundry in the challenges of IoT”* [ppt]

**Abstract**

Internet of Things (IoT) is a new engine for the semiconductor industry growth and will be fundamental to interconnect entities to help everyday life. Semiconductor company will supply products for many different applications, like wearable devices, automated lighting and heating and industrial automation. For this type of application the key word is technology diversification, i.e. what is under the “More than Moore” definition compared to the “More Moore” roadmap. In this context, where the number of connected things is forecasted to grow exponentially in the next decade, the European silicon foundry activity may play a significant role, thanks to its leadership in some key enabler technology, e.g. in sensors, MEMS, smart power, smart card devices and embedded secure elements, fundamental to address the security in the astronomic traffic of data communication.

- **Ing. Massimo Comparini, SPIN-IT e Telespazio**  
*“Titolo - TBD”*

**Coffee break (10:30-11:00, Terrazzo – primo piano)**

**Proposte di ricerca per H2020, iniziativa del Consiglio Scientifico CNIT (11:00-12:30, Aula Magna)** [pdf]

**(coordinamento: Prof. Enrico Del Re)**

**con intervento di:**

- **Dr. Akihiko K. Sugiyama, *Information and Media Processing Laboratories at NEC, Japan***  
*Topics:* Recent market changes for big ICT companies in Japan and definition of new business fields; examples of novel trends in industrial research and the role of embedded systems.

**Assemblea dei soci CNIT (11:30-12:30 – Aula 1A)**

**Paola Inverardi, Rappresentante italiana per l'ICT presso la CE (12:30-13:30, Aula Magna)**

*"Stato della ricerca europea: H2020 and beyond"*