



PALESTRAS INTERNACIONAIS 2018

Palestrante: **Dr. Marco Di Renzo**

**CNRS - Centre National de la Recherche Scientifique /
Paris-Saclay Université, Paris, France**

Título: **Stochastic Geometry Modeling and Optimization of Cellular Networks –
Bridging Accuracy and Complexity**

Data e Hora: **23 de Outubro de 2016, das 11:00 às 13:00 horas**

Local: **Pontifícia Universidade Católica do Rio de Janeiro (PUC-RJ)
Sala do Decanato do Centro Técnico Científico (CTC)
Rua Marquês de São Vicente, 225, Prédio Cardeal Leme, 12º andar**

Abstract

In the past few years, there have been many efforts to develop analytical methodologies for optimizing very ultra-dense networks, especially by using the mathematical tools of stochastic geometry and point processes. At the time of writing, however, we have understood that many proposed approaches have (at least one of the) two main limitations that make them unsuitable for optimizing cellular networks:

- Limitation 1: Due to the analytical complexity of the problem at hand, key system approximations need to be applied, which make the resulting analytical frameworks unsuitable for system optimization (relevant design parameters are not taken into account).*
- Limitation 2: Realistic network models result in analytical frameworks that are too complex to gain any insights on the fundamental properties of the networks and to perform large-scale optimization (the objective functions are non-convex and have multiple integrals).*

In this talk, I will describe two recent approaches that I have recently proposed to overcome the two limitations mentioned above:

- M. Di Renzo et al., “System-Level Modeling and Optimization of the Energy Efficiency in Cellular Networks - A Stochastic Geometry Framework”, IEEE Transactions on Wireless Communications, Vol. 17, No. 4, pp. 2539-2556, April 2018.*
- M. Di Renzo et al., “Inhomogeneous Double Thinning - Modeling and Analysis of Cellular Networks by Using Inhomogeneous Poisson Point Processes”, IEEE Transactions on Wireless Communications, Vol. 17, No. 8, pp. 5162-5182, August 2018.*

In the first paper, I have introduced a new analytical formulation of the coverage probability that I proved to be accurate and suitable for system-level optimization. In the second paper, I have introduced a new approach based on the theory of inhomogeneous Poisson point processes for modeling and analyzing communication networks with spatial correlations (either attractive or repulsive).

Biography of Dr. Di Renzo

Marco DI RENZO was born in L'Aquila, Italy, in 1978. He received the Laurea (cum laude) and Ph.D. degrees in electrical engineering from the University of L'Aquila, Italy, in 2003 and 2007, respectively, and the Habilitation à Diriger des Recherches (Doctor of Science) degree from University Paris-Sud, France, in 2013. Since 2010, he has been a Chargé de Recherche CNRS (CNRS Associate Professor) in the Laboratory of Signals and Systems (L2S) of Paris-Saclay University - CNRS, CentraleSupélec, Univ Paris Sud, Paris, France. He serves as the Associate Editor-in-Chief of IEEE Communications Letters, and as an Editor of IEEE Transactions on Communications, and IEEE Transactions on Wireless Communications. He is a Distinguished Lecturer of the IEEE Vehicular Technology Society and IEEE Communications Society, and a Senior Member of the IEEE. He is a recipient of several awards, including the 2013 IEEE-COMSOC Best Young Researcher Award for Europe, Middle East and Africa, the 2013 NoE-NEWCOM# Best Paper Award, the 2014-2015 Royal Academy of Engineering Distinguished Visiting Fellowship, the 2015 IEEE Jack Neubauer Memorial Best System Paper Award, the 2015-2018 CNRS Award for Excellence in Research and Ph.D. Supervision, the 2016 MSCA Global Fellowship (declined), the 2017 SEE-IEEE Alain Glavieux Award, the 2018 IEEE ICNC Silver Contribution Award, and 6 Best Paper Awards at IEEE conferences (2012 and 2014 IEEE CAMAD, 2013 IEEE VTC-Fall, 2014 IEEE ATC, 2015 IEEE ComManTel, 2017 IEEE SigTelCom).

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