

## **CURRICULUM VITAE**

### **Luisa Beghin**

Full Professor, Probability and Mathematical Statistics (MAT/06)

Department of Statistical Sciences,

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### **Education:**

- Ph.D. in “Statistica Metodologica”, Dipartimento di Statistica, Probabilità e Statistiche Applicate (Statistics Faculty) University “La Sapienza”, April 2000.
- M.Sc. in Statistics with Distinction, LSE, University of London, U.K, June 1995.

### **Previous positions:**

- Associate Professor in Probability and Mathematical Statistics (Mat/06) at Università “La Sapienza” di Roma, Oct. 2006 - Jan. 2017
- Temporary researcher in Probability and Mathematical Statistics (Mat/06) at Università “La Sapienza” di Roma, Jan. 2001 – Oct. 2006
- Temporary researcher in Statistics (Secs/S01) at University “Rome Tre” (1999-2000)
- Ph.D.student in Methodological Statistics, University of Rome, ‘La Sapienza’ - 1996-2000.
- M.Sc. and Ph.D. student, Dept. of Statistics, LSE, University of London – 1994-1996.

### **Some recent highlights and awards:**

- Kirk distinguished visiting fellowship, Isaac Newton Institute, Cambridge, 2022

- Associate editor, Chaos, Solitons and Fractals, 2021-
- Editorial board member, Fractional Calculus and Applied Analysis, 2022-

### **Selected contributions to international conferences:**

- Oslo (Norway), EMS 2005 Meeting- “Local time distribution for pseudo-processes governed by higher-order heat-type equations” - Jul. 2005.
- Paris (France), XXXI International Conference on SPA 2006 – “Stochastic processes arising from fractional differential equations”– Jul. 2006.
- Porto (Portugal), Conference on Probability and Statistics in Science and Technology - Sept. 2007.
- Swansea (U.K.), Workshop on Fractional Calculus and Random Processes – “Fractional relaxation equations and Brownian crossing probabilities of a random boundary” – Jun 2011 (invited).
- Kiev (Ukraine) – Conference on Modern Stochastics: theory and applications – “Generalized fractional continuous time random walks”– Sept. 2012.
- Bilbao (Spain) – Workshop on Fractional calculus and non-linear operators –“ On the fractional extensions of Gamma subordinator and Geometric Stable processes” – Nov. 2013 (invited)
- Catania, ICFDA 2014 – “Fractional shift operators and related stochastic processes” - Jun. 2014.
- Bilbao (Spain), BCAM Workshop – “Stable processes at Poisson times in connection with the fractional shift operator” – Nov. 2014 (invited).
- Roma, University Roma Tre, Workshop on Fractional calculus and its applications – “From fractional diffusion equations to fractional shift operators” - March 2015 (invited).
- Oxford (U.K.), SPA Conference 2015 –“Poisson processes with random drift”– Jul. 2015.
- St.Petersburg (Russia), Linnik Conference – “Lévy processes with Poisson and Gamma times”– Sept. 2015 (invited).
- Salerno University, Workshop on Stochastic models and related topics – “Lévy processes with Poisson and Gamma times” – Jan. 2016 (invited).
- Leiden University (Netherlands): Workshop "Fractality and Fractionality" - "Time-dependent fractional generators and related additive processes" - May 2016
- Milano (Politecnico): SIMAI 2016 Conference - "Time-dependent fractional generators and related additive processes" - Sept. 2016.
- Torino (University & Politecnico), First Italian Meeting on Probability and Mathematical Statistics " Fractional generators and time-changed stochastic processes" - June 2017 (invited).

- Budapest (Hungary): Nineth International Workshop of Applied Probability, Long-memory Gaussian processes governed by fractional Fokker-Planck equations - June 2018 (invited).
- Wroclaw (Poland): UMI-SIMAI-PTM Joint Meeting; "Fractional differential equations and time-changed stochastic processes" - Sept. 2018 (invited).
- Vietri: Second Italian Meeting on Probability and Mathematical Statistics - June 2019 - Organizer of the session "Probability and non-local operators: non-Markovian and time-changed processes"
- Napoli (online): Stochastic Models for Complex Systems "Stochastic processes related to incomplete gamma functions"- July 2020 (invited speaker)
- Kiev (online) – Conference on Modern Stochastics: theory and applications, V – “Stochastic processes related to incomplete gamma functions”–June 2021 (invited speaker).
- Cambridge (Isaac Newton Institute): Workshop "Deterministic and stochastic fractional differential equations and jump processes" - "Gamma-grey noise and gamma-grey Brownian motion " (invited speaker), february 2022
- Cambridge (Isaac Newton Institute): Workshop "Optimal control and fractional dynamics", - "Renewal processes related to general fractional operators " (invited speaker), april 2022
- Cambridge (Isaac Newton Institute): Kirk lecture (invited), - "Non-local differential operators in probability ", april 2022

## **Organization of conferences and meetings:**

### **•Workshop "Nonlocal and Fractional Operators"**

Department of Statistical Sciences, Sapienza University of Rome, April 12-13, 2019.

<https://sites.google.com/view/lfo12-13aprile2019/home>

### **•Recent Developments in Probability Theory and Stochastic Processes**

in honor of ENZO ORSINGHER, on the occasion of his 70th birthday

Dep. Statistical Sciences, Sapienza University of Rome, September 23, 2016

<https://sites.google.com/site/enzoorsingherconference/>

**•Fractional differential equations and their applications in probability theory and physics**

Department of Statistical Sciences, Sapienza University, November 6, 2015

**Other editorial duties:**

- AIMS Mathematics (associate editor)
- Bulletin of Taras Shevchenko National University of Kyiv. Series: Physics & Mathematics (associate editor)
- Sema-Simai Springer Series (editor)

**Referee for the journals:**

Alea

Electronic Journal of Probab.

Stochastic Processes and their Applications

Bernoulli

Electron. Communic. Probab.

Journal of Statistical Physics

Physica A: Statistical Mechanics and its Applications

Nonlinear Dynamics

Statistical Methods and Applications

Journal of Physics A. Mathematical and Theoretical,

Annals of Applied Probability

Journal Appl. Probab.,

Advances Appl. Probab.,

Fractional Calculus and Applied Analysis

Journal of Applied Mathematics,

Mathematical Methods in the Applied Sciences

Journal of Computational and Applied Mathematics,

Modern Stochastics and Applications,

Nonlinear Analysis: Hybrid systems,

Journal of Mathematical Analysis and Applications,

Statistics and Probability Letters,

Methods and Applications of Analysis,

Probability and Mathematical Statistics,

Note Matematiche,

Journal of Statistical Methods and Applications,

Journal of the Italian Statistical Society,

Modern Stochastics: Theory and Applications,

Stochastic Analysis and Applications,

Chaos, Solitons and Fractals

Methodology and Computing in Applied Probability

Mathematical Communications

Applied Mathematics Letters

Journal of Theoretical Probability

Fractal and Fractional

**Awarded grants:**

Consiglio Nazionale delle Ricerche grant, 1995-96;

University of Pisa, 1994-95;

NATO grant PST.CLG.97636, 2004.

NATO grant PST.CLG.980408, 2005;

MURST Research grant “Giovani Ricercatori” - “Calcolo Frazionario e sue Applicazioni”, 2001 (principal investigator)

Research grant Ateneo Federato AST, 2007 (principal investigator)

Research grant Ateneo Sapienza, 2009 (principal investigator)

Research grant Ateneo Sapienza, 2013 (principal investigator)

Research grant Ateneo Sapienza, 2017 (principal investigator)

Research grant Ateneo Sapienza, 2019 (principal investigator)

### **Attended Courses and Summer Schools:**

Cortona, SMI Course on Probability Topics – Jul-Aug. 1997;

Aarhus (Denmark), Empirical Processes – Aug. 1999.

### **Research interests:**

- Stochastic processes and their governing differential equations
- Lévy processes linked to fractional differential equations
- Subordination theory and processes with random time
- Fractional and anomalous diffusions
- Random motions with finite velocities and telegraph process
- Pseudoprocesses and signed measures
- Large and moderate deviations

## **Publications (as of May 2022):**

**- Number of papers in refereed journals: 54**

**- Number of books: 2**

### **List of publications:**

1. On the Maximum of the Generalized Brownian Bridge (with E.Orsingher) Lithuanian Mathematical Journal, 39, n.2 (1999), pp.200-213.
2. Approximate Asymptotic Bahadur Efficiency of Independence Tests with Random Sample Size (with Y.Y.Nikitin), Journal of the Italian Statistical Society, vol.8, n.1 (1999), pp.1-24.
3. Conditional Maximal Distributions of Processes Related to Higher-Order Heat-Type Equations (with E.Orsingher, K.Hochberg), Stochastic Processes and their Applications, 85(2000), pp.209-223.
4. Gaussian Limiting Behavior of the Rescaled Solution to the Linear Korteweg-de Vries Equation with Random Initial Conditions (with V.P.Knopova, N.N.Leonenko, E.Orsingher) Journal of Statistical Physics, vol.99, n.3/4 (2000), pp.769-781.
5. Joint Distributions of the Maximum and the Process for Higher-Order Diffusions (with E.Orsingher, T.Ragozina), Stochastics Processes and their Applications, vol.94 (2001), pp.71-93.
6. Probabilistic Analysis of the Telegrapher's Process with Drift by Means of Relativistic Transformations (with L.Nieddu, E.Orsingher), Journal of Applied Mathematics and Stochastic Analysis, vol.14, n. (2001), pp.11-25.
7. Random motions at finite velocity and their connections with hyperbolic equations (with E.Orsingher), Recent Research Developments in Statistical Physics, n.2 (2002), pp.1-20.
8. Weak Convergence of Some Randomly Indexed Empirical Processes, Probability and Mathematical Statistics, vol.22, n.1, (2002), pp.193-202.
9. How the Sojourn Time Distributions of Brownian Motion are Affected by Different Forms of Conditioning (with Y.Nikitin, E.Orsingher), Statistics and Probability Letters, vol.65, n.4 (2003), 291-302.
10. The telegrapher's process stopped at stable-distributed times and its connection with the fractional telegraph equation (with E.Orsingher), Fractional Calculus and Applied Analysis, vol.6, n.2 (2003), 187-204.
11. On the Maximum of Some Conditional and Integrated Gaussian Fields and their Statistical Applications, Statistical Inference for Stochastic Processes, vol. 8, n.1, (2005) 51-70.

- 12.Exact small ball constants for some Gaussian processes under  $L_2$  -norm, (with Y.Nikitin, E.Orsingher), Journal of Mathematical Sciences, vol.128, n.1 (2005) 2493-2502, translated from POMI, Zapiski Nauchn. Semin., vol.298, (2003), 5-21.
- 13.Time-fractional telegraph equations and telegraph process with Brownian time (with E.Orsingher), Probability Theory and Related Fields, vol.128 (2004), pp.141-160.
- 14.The distribution of the local time for “pseudo-processes” and its connections with fractional diffusion equations (with E.Orsingher), Stochastic Processes and their Applications (2005), vol.115, pp.1017-1040.
- 15.On the Maximum of Some Conditional and Integrated Gaussian Fields and their Statistical Applications”, L.Beghin, Statistical Inference for Stochastic Processes, vol. 8, n.1, (2005) 51-70.
- 16.Probabilità e Modelli Aleatori (with E.Orsingher), **Aracne editrice**: Roma, 2006.
- 17.On the solutions of linear odd-order heat-type equations with random initial conditions (with Yu.Kozachenko, E.Orsingher, L.Sakhno), Journal of Statistical Physics, (2007), vol.127, n.4, 721–739.
- 18.Pseudoprocesses governed by higher-order fractional differential equations, Electronic Journ. Probab., 13, n.16, p.467–485 (2008).
- 19.Fractional diffusion equations and processes with randomly-varying time (with E.Orsingher), Annals of Probability, vol. 37 (1); p. 206-249 (2009).
- 20.Iterated elastic Brownian motions and fractional diffusion equations, (with E.Orsingher). Stochastic Proc. and their Appl., vol. 119 (6); p. 1975-2003 (2009).
- 21.Fractional Poisson processes and related planar random motions (with E.Orsingher). Electronic Journ. Probab., vol. 14, n.61; p. 1790-1826 (2009).
- 22.Introduzione alla Probabilità: dalle nozioni fondamentali alle applicazioni (with E.Orsingher), **Carocci Ed.**; Roma 2009.
- 23.Moving randomly amid scattered obstacles (with E.Orsingher) Stochastics, vol. 82 (2); p. 201-229 (2010).
- 24.Poisson-type processes governed by fractional and higher-order recursive differential equations (with E.Orsingher). Electronic Journ. Probab, vol. 15 (22); p. 684-709 (2010).
- 25.Poisson process with different Brownian clocks (with E.Orsingher), Stochastics, vol.84, n.1, p. 79-112 (2012).
- 26.Equations of Mathematical Physics and Compositions of Brownian and Cauchy processes (with E.Orsingher, L.Sakhno), Stochastic Analysis and Applications, v. 29, no. 4, p.551-569 (2011).



27. Fractional relaxation equations and Brownian crossing probabilities of a random boundary, *Advances Appl. Probability*, v.44, 479- 505 (2012).
28. Random-time processes governed by differential equations of fractional distributed order, *Chaos, Solitons and Fractals*, v.45, 1314-1327, (2012).
29. Alternative forms of Compound fractional Poisson processes (with C.Macci), *Abstract and Applied Analysis*, (2012), pp.30.
30. Large deviations for fractional Poisson processes (with C.Macci), *Statistics and Probability Letters*, vol.83, (2013), 1193-1202.
31. Fractional discrete processes: compound and mixed Poisson representations (with C.Macci) *Journ. Appl. Probab.*, vol. 51 (1), (2014), pp.19-36.
32. Fractional Poisson process with random drift (with M. D'Ovidio), *Electron. J. Probab.* **19** (2014), no. 122, 1–26.
33. Geometric Stable processes and related fractional differential equations, *Electron. Commun. Probab.* **19** (2014), no. 13, 1–14.
34. Generalized fractional nonlinear birth processes (with M.Alipour, D.Rostamy), *Methodol. Comput. Appl. Probab.* (2015), 17, 525–540.
35. On fractional tempered stable processes and their governing differential equations, *Journal of Computational Physics*, 293 (2015), pp.29–39.
36. Fractional Gamma process and fractional Gamma-subordinated processes, *Stoch. Anal. Appl.* (2015), 33, pp. 903–926.
37. Correlated fractional counting processes on a finite-time interval (with R.Garra and C.Macci), *Journ. Appl. Probab.*, 52 (2015), pp. 1-17.
38. Population processes sampled at random times (with E.Orsingher), *Journal of Statistical Physics*, (2016), 163 (1), 1-21.
39. Multivariate fractional Poisson processes and compound sums (with C.Macci), *Advances Applied Probability* (2016), 48, 691–711.
40. Asymptotic results for a multivariate version of the alternative fractional Poisson process (with C.Macci), *Statistics and Probability Letters*, (2017), 129, 260-268.
41. Space-fractional versions of the negative binomial and Polya-type processes (with P. Vellaisamy), *Methodology and Computing in Applied Probability*, (2018), 20:463–485.
42. Fractional diffusion-type equations with exponential and logarithmic differential operators, *Stochastic Processes and their Applications*, 128 (2018), 2427–2447.

43. Time-inhomogeneous fractional Poisson processes defined by the multistable subordinator (with C. Ricciuti), 2019, *Stochastic Analysis and Applications*, 37, (2), 171–188.
44. Long-memory Gaussian processes governed by generalized Fokker-Planck equations, 2019, *ALEA*, *Lat. Am. J. Probab. Math. Stat.* 16, 439–461.
45. Pseudo-differential operators and related additive geometric stable processes (with C. Ricciuti), 2019, *Markov Processes and Related Fields*, 25, 415–444.
46. A note on the generalized relativistic diffusion equation, (with R. Garra), *Mathematics*, 2019, 7 (11), 1009.
47. Integro-differential equations linked to compound birth processes with infinitely divisible addends (with J. Gajda, A. Maheshwari), *Math. Methods Appl. Sciences*, 2020, 1–17.
48. Commutative and associative properties of the Caputo fractional derivative and its generalizing convolution operator (with M. Caputo), 2020, *Commun. Nonlinear Science Num. Simul.* 89, 1–7.
49. Random time-change with inverses of multivariate subordinators: governing equations and fractional dynamics (with C. Macci, C. Ricciuti), 2020, *Stochastic Processes and their Applications*, 130 (10), 6364–6387.
50. Tempered relaxation equation and generalized stable processes (with J. Gajda), *Fract. Calcul. Appl. Anal.*, 23, n.5, 2020, 1248–1273, available at <http://www.degruyter.com/view/j/fca>.
51. Random time-changes and asymptotic results for a class of continuous-time Markov chains on integers with alternating rates (with C. Macci, B. Martinucci), 2021, *Modern Stochastics: Theory and Applications*, 8 (1), 63–91.
52. Prabhakar Lévy Processes (with J. Gajda), *Statistics and Probability Letters*, 178, 2021, in press.
53. Lévy processes linked to the lower-incomplete gamma function (with C. Ricciuti), *Fractal and Fractional*, 2021, 1–17.
54. Stochastic applications of Caputo-type convolution operators with non-singular kernels (with M. Caputo), *Stochastic Analysis and Applications*, published online, 2022, DOI:10.1080/07362994.2021.2021091.
55. Stochastic solutions for time-fractional heat equations with complex spatial variables (with A. De Gregorio), 2022, *Fractional Calculus and Applied Analysis*, 25, 244–266.
56. Non-central moderate deviations for compound fractional Poisson processes (with C. Macci), 2022, *Statistics and Probability Letters*, 185, 109424.

### **Other manuscripts:**

- Ph.D. Thesis: “Su Alcuni Funzionali di Campi Aleatori con Applicazioni al Processo Empirico Generalizzato”, Dipartimento Statistica, Probabilità e Stat. Appl., Università Sapienza, 2000.

### **Bibliometric Indicators (as of May 2022):**

- Google Scholar database

Documents: 61

Citations: 1387

H-index: 18

- Scopus database:

Documents: 49

Citations: 877 by 572 documents

H-index: 16

Co-authors: 22

- Mathscinet database:

Documents: 45

Citations: 522 by 304 authors

H-index: 12

Co-authors: 19

### **ResearchGate profile:**

[https://www.researchgate.net/profile/Luisa\\_Beghin](https://www.researchgate.net/profile/Luisa_Beghin)

## **Teaching activity: undergraduate and graduate courses**

a.a. 1997-1998 and 1999, Statistica, Scuola Superiore della Pubblica Amministrazione, Rome.

a.a. 1999-2000, Statistica, University “Roma Tre”, Teaching Assistant.

a.a. 2000-2001, 2005-2006, Probabilità, Fac. of Statistics, Sapienza, Teaching Assistant.

a.a. 2006-2007, 2007-2008, 2008-2009; Probabilità (Degree in Statistics), Fac. of Statistics, Sapienza.

a.a. 2009-2010, 2010-2011, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022: Probabilità e Laboratorio, 12 CFU (degree in Statistics and Actuarial Sciences), Dep. Statistical Sciences, Sapienza.

a.a. 2009-2010, 2019-2020, 2020-2021, Approfondimenti di Probabilità, Percorsi d’eccellenza Corso di Laurea in SEFA, Dep. of Statistical Sciences. Sapienza Univ.

a.a. 2016-2017, Stochastic Processes (master degree in Data Science), Sapienza Univ.

a.a. 2017-2018, 2018-2019, Probabilità e Statistica, (degree in Informatic Engineering), Sapienza Univ.

a.a. 2019-2020, 2020-2021, Calcolo delle Probabilità, (degree in Electronic Engineering), Sapienza Univ.

a.a. 2021-2022, Calcolo delle Probabilità, (degree in Management Engineering), Sapienza Univ.

a.a. 2021-2022, Processi Aleatori per le Scienze Applicate, (master degree in Statistical Sciences), Sapienza Univ.

## **Teaching activity: Ph.D. courses**

a.a. 2011-2012, Teoria della misura, Dep. Statistical Sciences, Sapienza.

a.a. 2012-2013, Processi di Lévy, Dep. Statistical Sciences, Sapienza.

a.a. 2015-2016, Processi di rinnovo, Dep. Statistical Sciences, Sapienza.

a.a. 2020-2021, Processi di Lévy, Dep. Statistical Sciences, Sapienza.

Roma, 17 May 2022