

<b>Part A. PERSONAL INFORMATION</b>		<b>CV date</b>		13/09/2018
First and Family name	María Dolores Ruiz Medina			
Social Security, Passport, ID number	26470730F	Age	51	
Researcher numbers	Researcher ID	H-5582-2015		
	ORCID code	0000-0001-7445-7060		

**A.1. Current position**

Name of University/Institution	University of Granada			
Department	Department of Statistics and Operational Research			
Address and Country	Avda. Fuente Nueva S/N, 18071 Granada (Spain)			
Phone number	958 243270	E-mail	<a href="mailto:mruiz@ugr.es">mruiz@ugr.es</a>	
Current position	Full Professor		From	15/03/2006
Espec. cód. UNESCO	120808, 120913, 120805, 60G60, 60G15, 60G22;60G20, 60G17, 60G12			
Palabras clave	Central and Non-Central limit results for random fields, isotropic spherical random fields, stochastic fractional and multifractional pseudodifferential equations on manifolds, inference for Banach-valued stochastic processes, random fields on Riemannian manifolds, point pattern and functional data analysis in metric spaces			

**A.2. Education**

Degree or Positions	University	Year
BSc. in Mathematics	University of Granada	1990
PhD in Mathematics	University of Granada	1993

**A.3. JCR articles, h Index, thesis supervised...**

Item	Total
JCR index journal articles	93
Q1 JCR index journal articles	26
JCR index journal articles in the last five years	34
Q1 JCR index journal articles in the last five years	8
h index	15
Cites	724
Average cites/year during the period 2013-2017	61
Supervised thesis during the period 2008-2017	3
Positive evaluation of six-years research from the National Committee for the Assessment of the Research Action (CNEAI)	4 (2011-2016)

**Part B. CV SUMMARY** (max. 3500 characters, including spaces)

My PhD thesis was presented in 1993, supervised by MJ Valderrama. The central topic was the orthogonal representation of different families of second-order random fields. I got my permanent position in 1996, and I am Full Professor since 2006, as member of the Department of Statistics and O.R., at Granada University. The collaboration with JM Angulo and VV Anh focused my research lines around the analysis of mean-quadratic variation properties of the solution to stochastic partial differential/pseudodifferential equations. This research period (8 stays in Queensland University) was developed since August, 1995. Some fractional extensions of the Burgers equation with random initial conditions lead to the research collaboration with NN Leonenko from Cardiff University. Since 2004, I have collaborated with him until the present. Our main topic has been Central and Non-Central Limit Theorems (CLT and NCLT) for the analysis of the asymptotic behavior of non-linear functionals of Gaussian and chi-squared random fields. Special attention has been paid to

the asymptotic analysis of the solution to linear fractional and multifractional versions of the heat equation, and to the nonlinear case, e.g, random Burgers equation. Actually, we are currently working on high-frequency *Non-Central Limit Theorems for spherical isotropic random fields*, as starting point for the extension to the general case of compact Riemannian manifolds. In addition, the joint collaboration with NN Leonenko and AV Ivanov (National Technical University of Kiev), was mainly focused on random field parametric nonlinear regression, after deriving some random field CLTs published in *Annals of Probability* in 2013. The collaboration with M Taqqu allowed to develop a new research line, regarding Non-Central Limit Theorems for nonlinear integrated functionals of Gaussian and Chi-squared random fields (Leonenko et al., 2013). Recently, the collaboration with D Bosq motivated the contact with the field of functional time series, where I introduced and estimated a new family of spatial functional time series models, SARH(1) models (see Ruiz-Medina, 2011, 2012). We worked on a new topic on Bayesian inference in functional data analysis (Bosq and Ruiz-Medina, 2014). My last PhD student Álvarez-Liébana, who defended his thesis on July 2018, has also participated in this collaboration, in the field of functional time series, where his thesis was developed. The above summarized lines were more theoretical, within Mathematics, Probability and Statistics. Regarding the main applied research lines, I will refer to the parametric and non-parametric estimation, and prediction of real-valued and Hilbert-valued random fields. In this context, wavelet expansions, least-squares and moment-based estimation, inverse problems and regularization, as well as FANOVA models (Ruiz-Medina, 2016) have played a major role. Several real-data applications in Environmental Sciences, Finances and Medicine have been addressed, leading to new collaborations in these topics.

***I am co-author or author of 111 publications (99 collected in Web of Science), 93 of them are articles published in JCR indexed journals, and 5 have been written alone. I have supervised 6 PhD Thesis, and presented more than 100 contributions at conferences. I have participated in 18 research projects (chief investigator in 8 of them, where I have opened several new research lines related to Random Field Theory and Inference).***

## Part C. RELEVANT MERITS

### C.1. Publications (including books). Selected papers in the last eight years

- Ruiz-Medina, MD and Álvarez-Liébana, J (2018a). Strongly consistent autoregressive predictors in abstract Banach spaces. *Journal of Multivariate Analysis*. Accepted manuscript, in press. <https://doi.org/10.1016/j.jmva.2018.08.001>.
- Ruiz-Medina, MD and Álvarez-Liébana, J (2018b). A note on strong-consistency of componentwise ARH(1) predictors. *Statistics & Probability Letters*. Accepted manuscript, in press <https://doi.org/10.1016/j.spl.2018.09.004>.
- Ruiz-Medina, MD and Álvarez-Liébana, J (2018c). Classical and Bayesian componentwise predictors for non-compact correlated ARH(1) processes. *REVSTAT*. Accepted manuscript, in press. [https://www.ine.pt/revstat/forthcoming\\_papers.html](https://www.ine.pt/revstat/forthcoming_papers.html).
- Ruiz-Medina, MD, Miranda, D and Espejo, RM (2018). Dynamical multiple regression in function spaces, under kernel regressors, with ARH(1) errors. *Test*. Accepted manuscript, in press. <https://doi.org/10.1007/s11749-018-0614-2>.
- Álvarez-Liébana, J, Bosq, D and Ruiz-Medina, MD (2017). Asymptotic properties of a componentwise ARH(1) plug-in predictor. *Journal of Multivariate Analysis* 155, 12-34.
- Álvarez-Liébana, J and Ruiz-Medina, MD (2017). The effect of the spatial domain in FANOVA models with ARH(1) error term. *Statistics and its Interface* 10, 607-628.
- Leonenko, NN and Ruiz-Medina, MD (2017). Increasing domain asymptotics for the first Minkowski functional of spherical random fields. *Theory of Probability and Mathematical Statistics* 97, 120-141.
- Leonenko, NN, Ruiz-Medina, MD and Taqqu, MS (2017a). Non-central limit theorems for random fields subordinated to Gamma-correlated random fields. *Bernoulli* 23, 3469-3507.
- Leonenko, NN, Ruiz-Medina, MD and Taqqu, MS (2017b). Rosenblatt distribution subordinated to Gaussian random fields with long-range dependence. *Stochastic Analysis and Applications* 35, 144-177.

- Álvarez-Liébana, J, Bosq, D and Ruiz-Medina, MD (2016). Consistency of the plug-in functional predictor of the Ornstein-Uhlenbeck process in Hilbert and Banach spaces. *Statistics and Probability Letters* 117, 12-22.
- Ruiz-Medina, MD (2016). Functional analysis of variance for Hilbert-valued fixed effect models with correlated noise. *Statistics: A Journal of Theoretical and Applied Statistics* 50, 689-715.
- Anh, VV, Leonenko, NN and Ruiz-Medina, MD (2016). Space-time fractional stochastic equations on regular bounded open domains. *Fractional Calculus and Applied Analysis* 19, 1161-1199.
- Anh, VV, Leonenko, NN and Ruiz-Medina, MD (2016). Fractional-in-time and multifractional-in-space stochastic partial differential equations. *Fractional Calculus and Applied Analysis* 19, 1434-1459.
- Ruiz-Medina, MD and Porcu, E (2015). Equivalence of Gaussian measures of multivariate random fields. *Stochastic Environmental Research and Risk Assessment* 29, 325-334.
- Bosq, D and Ruiz Medina, MD (2014). Bayesian estimation in a high dimensional parameter framework. *Electronic Journal of Statistics* 8, 1604-1640.
- Ivanov, AV, Leonenko, NN, Ruiz-Medina, MD and Savich, IN (2013). Limit theorems for weighted non-linear transformations of Gaussian processes with singular spectra. *Annals of Probability* 41, 1088–1114.
- Ruiz-Medina, MD (2012). Spatial functional prediction from spatial autoregressive Hilbertian processes. *Environmetrics* 23, 119-128.
- Ruiz-Medina, MD and Espejo RM (2012) Spatial autoregressive functional plug-in prediction of ocean surface temperature. *Stochastic Environmental Research and Risk Assessment* 26, 335-344.
- Leonenko, NN Ruiz-Medina, MD and Taqqu, M (2011). Fractional elliptic, hyperbolic and parabolic random fields. *Electronic Journal of Probability* 16, 1134-1172.
- Ruiz-Medina, MD (2011). Spatial autoregressive and moving average Hilbertian processes. *Journal of Multivariate Analysis* 102, 292–305.
- Ruiz-Medina, MD, Porcu, E and Fernández-Pascual, R (2011). The Dagum and auxiliary covariance families towards reconciling two-parameter models that separate fractal dimension and Hurst effect. *Probabilistic Engineering Mechanics* 26, 259-268.

## C.2. Research projects and grants (in the last ten years)

- Reference: MTM2015-71839-P.  
Title: Funcionales de campos aleatorios. Teoría Asintótica e inferencia.  
Dirección general de investigación científica y técnica. Ministerio de Economía y Competitividad. Programas del Plan Nacional I+D.  
Chief Investigator: M. Dolores Ruiz Medina, University of Granada.  
Dates: 01/01/2016 – 31/12/2018. Amount of the grant: 25.100 €.
- Reference: MTM2012-32674.  
Title: Teoremas límite para procesos espacio-temporales e inferencia funcional asintótica con aplicaciones al análisis de cambio climático, microarrays de cadena y capital financiero  
Ministerio de Economía y Competitividad. Programas del Plan Nacional I+D.  
Chief Investigator: M. Dolores Ruiz Medina, University of Granada.  
Dates: 01/01/2013 – 31/12/2015. Amount of the grant: 26.900 €.
- Reference: P09-FQM-5052.  
Title: Análisis Estadístico de Series Funcionales. Aplicaciones en el Desarrollo de Estudios Empíricos sobre Finanzas de Empresa.  
Junta de Andalucía. Proyectos de Excelencia.  
Chief Investigator: M. Dolores Ruiz Medina, University of Granada.  
Dates: 01/01/2010 – 31/12/2013. Amount of the grant: 122.174 €.
- Reference: MTM2009-13393.  
Title: Teoría Asintótica de Estimadores de Proyección. Aplicaciones en Biomedicina.  
Ministerio de Ciencia y Tecnología. Programas del Plan Nacional I+D.  
Chief Investigator: M. Dolores Ruiz Medina, University of Granada.

Dates: 01/01/2010 – 31/12/2012. Amount of the grant: 28.435,01 €.

- Reference: MTM2008-03903.

Title: Métodos Wavelets para la Inferencia sobre Datos Funcionales en Espacios Singulares.

Ministerio de Ciencia e Innovación. Programas del Plan Nacional I+D.

Chief Investigator: M. Dolores Ruiz Medina, University of Granada.

Dates: 01/01/2009 – 31/12/2009. Amount of the grant: 32.670 €.

## C.5.1 Invited and plenary talks in the last six years

M.D. Ruiz-Medina. Asymptotic Properties of Functional Parameter Estimators of Autoregressive Hilbertian Processes. **Plenary talk** in Modern Stochastics. Theory and Applications III. Kiev, Ukraine (10/09 / 12-14 / 09/12).

M.D. Ruiz-Medina, N.N. Leonenko and V.V. Anh. Fractional Riesz-Bessel Motion on the Ball. **Invited talk** in 10 AIMS Conference on Dynamical Systems, Differential Equations and Applications. Madrid, Spain (07/07 / 14-11 / 07/14).

M.D. Ruiz-Medina, J.M. Angulo, G. Christakos and R. Fernández-Pascual. Fractional pseudodifferential modeling through spatiotemporal duality applied to Geosciences. **Invited talk** in Joint METMAVII and GRASPA14 Workshop. Venue Torino, Italy (10/09 / 14-12 / 09/14).

M.D. Ruiz Medina. Fractional in Time and Multifractional in Space Evolution Equations Driven by Fractional Integrated White Noise. **Plenary talk** in Fractality and Fractionality Workshop. Lorentz Center Leiden, Holland (17/05 / 2016-20 / 05/2016).

M.D. Ruiz-Medina and N.N. Leonenko. Increasing and Fixed Domain Asymptotics for Functionals of Spherical Random Fields **Invited talk** in Workshop Isotropic Random Fields in Astrophysics. Cardiff (U.K.) (29/06 / 2017-30 / 06/2017).

**C5.2 Diffusion scientific activities.** I have been several times as Visitor Professor at the School of Mathematics of the Queensland University of Technology (Australia), and of Cardiff University (U.K.), given several seminars.

## C.6. Others

I have been referee of several journals: Collectanea Mathematica, Computational Statistics, Computational Statistics and Data Analysis, Environmetrics, Estadística Española, Journal of Applied Probability, Stochastic Environmental Research and Risk Assessment, Test, Journal of Statistical Physics, Journal of Statistical Planning and Inference, Signal Processing, Communications in Statistics: Theory and Methods, Journal of Mathematical Analysis and Applications, Nonlinear Analysis, Biometrika, Brazilian Journal of Probability and Statistics, Journal of Multivariate Analysis, Bioinformatics, Statistics and Probability Letters, Econometrics and Statistics, among others.

I was Associate Editor of *Journal Stochastic Environmental Research and Risk Assessment*, Springer (2014-2015); *Spatial Statistics*, Elsevier (since 2012); and *Journal: Modern Stochastics: Theory and Applications* (since 2016).

I have been reviewer of the Spanish National Research Projects during the period 2003-2016; I have been a member of the Evaluating Committee for the Spanish research projects “Ramón y Cajal” and “Juan de la Cierva” during the years 2007 and 2009. I have also been a member of the Evaluating Committee for the Israel Science Foundation (ISF) in 2004. I have taken part in the AEI Mathematical Committee last year (November, 2017). I am active alternate member of ANECA.