1. **Publishable summary (expected length: max. 500 words)**

Lymphocyte T cells are responsible for cell-mediated adaptive immune responses, involving transient interactions of the T-cell receptor (TCR) with peptides presented by mayor histocompatibility complex (MHC) proteins. A productive interaction triggers the T cell signaling leading to the immunological synapse. Initially, the TCR is phosphorylated by the LCK, a membrane-anchored tyrosine kinase, producing membrane micro- and nano-clusters; another functional direct consequence of the triggering is the free cytosolic calcium release. Understanding the T-cell pre-synaptic triggering implies comparing resting vs. activated states. There is poor quantitative information on the early activation process, mainly because there is no proper model that mimics the truly resting state. T cells are suspension cells, and under the microscope have always been studied in contact with a surface. For instance, cell basal membrane Super-resolution imaging techniques suggested protein pre-clustering into “nano-domains” in resting cells, contradicting the classical view of cluster formation upon activation. In the first stage of the project we focused in developing a model that mimics physiologically the true resting state, and that can be used to employ super-resolution structural and dynamical optical microscopy. We studied live T cells in suspension employing a hydrogel in a density gradient, and used STED nanoscopy to unravel the plasma membrane distribution and dynamics of TCR and LCK in T-cells on surfaces and in suspension. We first used this protocol to understand the different dynamical and structural reorganisation states of the actin cytoskeleton during the early Tcell activation. This work has been recently published in Science Advances (Fritzsche et al, 2017). Next, we have focus in the localisation, and distribution of the TCR and LCK in suspension, and in the close contact regions, and we have followed the dynamics of these two crucial proteins individually and together, and we have observed the calcium release. For this purpose, we had to develop a method to suit our existing microscopes (scanning FCCS, and scanning STED FCCS), and we had to generate the software to analyse the data (FoCuS\_scan). This new methodology has been recently published in the journal methods (Waithe et al, 2017) and the software is been made freely available to academic users via GitHub, and licenced under an IP with the University of Oxford. Employing this experimental approach, we found that T cells suspended in the hydrogel do not triggered calcium, indicating absence of activation; while classically considered resting states triggered calcium in a similar fashion as when cells were deposited onto a surface functionalized by antibody (antiCD3 and antiCD28) coating. In contrast to surface-contacting, suspended T-cells showed mostly a uniform distribution of LCK and TCR. Nevertheless, they still displayed heterogeneity in the diffusion at the plasma membrane in the true resting state. We found several components of mobility rather than a single one. These different diffusion coefficients were remarkably slower when T cells were in contact with any of the studied surfaces. Our results suggest that pre-clustering of signaling receptors and cell-surface proteins in resting T-cells needs reconsideration and that understanding the T cell activation requires a true resting state, which we can be obtained by means of hydrogels. This work is currently in second round of revision in the journal Nature Immunology.

1. **Project Deliverables and** **achievements during the period (expected length: max. 2000 words):**

• **IMPACT** Please describe the specific impact of the research undertaken in terms of scientific/technical/commercial and/or social impact.

**PATENTS & INTELLECTUAL PROPERTIES**

**Intellectual Property** with Dr. D. Waithe, and Prof, C. Eggeling of “FoCuS-scan”, advanced analysis software for scanning fluorescence correlation spectroscopy (scan-FCS) data, which combines state-of-the-art published algorithms in a user-friendly and efficient format. Oxford University Innovation Ltd Project No. 14147.

**PUBLICATION LIST** *(****#****, 1st author;* ***#******#****, 2nd author;* ***\*****, corresponding author; \*\*, journal cover)*

***Regular and Review articles***

30\*. E.Garcia, J Bernardino de la Serna\* (2017)“Dissecting single cell molecular spatiotemporal mobility and clustering at Focal Adhesions in polarised cells by fluorescence fluctuation spectroscopy methods” (In revision in Methods, in BioRXiv, <https://doi.org/10.1101/220491>) *(\*corresponding author)*

29\*. S. Sreedharan, MR Gill, E Garcia, HK Saeed, D Robinson, A Byrne, A Cadby, TE. Keyes, C Smythe, P Pellett\*, **J Bernardino de la Serna\***, and JA. Thomas\*. “Multimodal super-resolution optical microscopy using a transition metal-based probe provides unprecedented capabilities for imaging nuclear chromatin.” *(JACS,* *Publication Date (Web): October 4, DOI: 10.1021/jacs.7b08772) (\*corresponding author)*

28. D Waithe, F Schneider, J Chojnacki, M.P. Clausen, D Shrestha, **J Bernardino de la Serna**, C Eggeling. (2017) “Advanced processing and analysis of conventional confocal microscopy generated scanning FCS data”. ***Methods*** Accepted (BioRxiv. 163766)

27. M. Fritzsche\*, R. Fernandes\*, V.T. Chang, H. Colin-York, M.P. Clausen, J.H. Felce, S. Galiani, C. Erlenkämper, M. Santo, J.M. Heddleston, D. Waithe, **J. Bernardino de la Serna**, B.C. Lagerholm, T.-L. Liu, T.L. Chew, E. Betzig, S.J. Davis, and C. Eggeling. (2017) “Cytoskeletal actin dynamics shape a ramifying actin network underpinning immunological synapse formation” ***Science Advances*** 3 (6), e1603032

26. M Aron, R Browning, D Carugo, E Sezgin, **J Bernardino de la Serna**, C Eggeling, and E Stride. (2017) “Spectral Imaging Toolbox". ***BMC Bioinformatics*** 18 (1), 254

25. B. Mao, DG. Calatayud, V Mirabello, H Ge, BJ. Hodges, RMJ. Jacobs, AM. Shepherd, JA Ribeiro Martins, N Kuganathan, **J. Bernardino de la Serna**, SW. Botchway, and SI. Pascu. (2017) “Fluorescence Lifetime Imaging and Super resolution microscopies shed light into the self-assembly of functional porphyrins on insulating surfaces” ***Chemistry - A European Journal*** DOI:10.1002/chem.201605232

24. V. Pereno; D. Carugo; L. Bau; E. Sezgin; **J. Bernardino de la Serna**; C. Eggeling; E. Stride (2017) "Electroformation of Giant Unilamellar Vesicles on Stainless Steel Electrodes", ***ACS Omega*** 2 (3), 994

23. A. Polley, A. Orlowski, R. Danne, A.A. Gurtovenko, **J. Bernardino de la Serna**, C. Eggeling, SJ Davis, T. Rog, I Vattulainen. (2017) “Glycosylation and lipids working in concert direct CD2 ectodomain orientation and presentation”, ***J Phys Chem Lett***. 8 (5), pp 1060–1066

22. D Carugo, M Aron, E Sezgin, **J Bernardino de la Serna**, M Kuimova, C Eggeling, and E Stride. (2017) “Modulation of the molecular arrangement in artificial and biological membranes by phospholipid-shelled microbubbles” ***Biomaterials*** 113, 105-117

21#. **J Bernardino de la Serna**, G J. Schütz, C Eggeling, and M Cebecauer. (2016) “Plasma membrane organisation: principles and open questions” ***Front. Cell Dev. Biol.***, 4: 106. (review)

20. T Stanly, M Fritzsche, S Banerji, E Garcia, **J Bernardino de la Serna**, D Jackson, C Eggeling. (2016) “Critical importance of fixation conditions in super-resolution imaging of receptor clustering"

***Biol. Open*** 15;5(9):1343-1350

19. E. García, C. Ragazzini, X Yu, E. Cuesta-García, **J. Bernardino de la Serna**, T. Zech, D. Sarrió, L.M. Machesky, I.M. Antón. (2016) "WIP and WICH/WIRE co-ordinately control invadopodium formation and maturation in human breast cancer cell invasion" ***Scientific Reports.***vol 6 23590

18\*\*. R. Jarrett, M. Salio, A. Lloyd-Lavery, S. Subramaniam, E. Bourgeois, C. Archer, A. Cheung, C. Hardman, D. Chandler, M. Salimi, D. Gutowska-Owsiak, **J. Bernardino de la Serna**, P. Fallon, H. Jolin, A. Mckenzie, A. Dziembowski, E. Podobas, W. Bal, D. Johnson, D.B. Moody, V. Cerundolo, G. Ogg. (2016) “Filaggrin inhibits generation of CD1a neolipid antigens by house dust mite derived phospholipase”. ***Sci Transl Med***. 10;8(325):325ra18 *(Cover of the journal)*

17. M. P. Clausen, E. Sezgin, **J. Bernardino de la Serna**, D. Waithe, B. C. Lagerholm, C. Eggeling. (2015) “A straightforward approach for gated STED-FCS to investigate lipid membrane dynamics” ***Methods****, June 6th*

16\*\*. E. Sezgin, D. Waithe, **J. Bernardino de la Serna**, and C. Eggeling (2015). "Spectral Imaging to Measure Heterogeneity in Membrane Lipid Packing" ***ChemPhysChem****.16 (7)* DOI: 10.1002/cphc.201402794 *(Cover of the Journal)*

# 15#. M. P. Clausen\*, S. Galiani\*, **J. Bernardino de la Serna**\*, M. Fritzsche, J. Chojnacki, K. Gehmlich, B. C. Lagerholm, C. Eggeling (2014) “Pathways to optical STED microscopy”. ***NanoBioImaging*.** 2014; 1:1-12. (\* *equal contribution)*

*Submitted articles (In revision)*

1.# D. Gutowska-Owsiak\*, **J. Bernardino de la Serna\***, M. Fritzsche\*, E.I. Podobas, M. Leeming, H. Colin-York, C. Eggeling, and G. Ogg. “Orchestrated control of filaggrin-cytoskeletal scaffolds underpins skin barrier formation” (\*equal contribution, in revision in ***Cell Death and Disease***, in revision CDD-17-0898)

2.##AM Santos\*, A Ponjavic\*, M Fritzsche\*, RA Fernandes\*, **J Bernardino de la Serna**, F Schneider, JT McColl, KA Ganzinger, D Depoil, ML Dustin, SJ Davis, D Klenerman, C Eggeling, SF Lee. “Capturing resting T-cells: the perils of Poly-L-Lysine”. (\*equal contribution) In revision in ***Nature Immunology*** *March 2017, NI-L24396.*

***Proceeding and popular science Articles***

1. R. Jarrett, G. Ogg, M. Salio, A. Lloyd-Lavery, S. Subramaniam, E. Bourgeois, C. Archer, A. Cheung, C. Hardman, D. Chandler, M. Salimi, D. Gutowska-Owsiak, **J. Bernardino de la Serna**, P. Fallon, H. Jolin, A. Mckenzie, A. Dziembowski, E. Podobas, W. Bal, D. Johnson, D.B. Moody, V. Cerundolo (2016) “Filaggrin inhibits house dust mite phospholipase generation of CD1a lipid antigens for recognition by T cells”. Conference: 20th Anniversary Conference of the British-Skin-Foundation on Skin Deep. British Journal of Dermatology · October 2016 Volume: 175 p 50

• **TRANSFER OF KNOWLEDGE** This should comprise activities related to the transfer of knowledge to the Host Institution and beyond (e.g. seminars, workshops, teaching activities).

TEACHING & SUPERVISING

Postdoctoral Research Associate Dr. Esther Garcia Gonzalez. (2017-) Dr. Garcia joined the group in January 2017 to work in “Immunophysics and Immunoengineering of the Tcell and cancer microenvironment”.

Sandwich Student Connor Barker, University of Manchester. Faculty of Chemistry. (2016-2017) “Measuring the forces and revealing preferential nanoparticle preferential delivery pathways across lung surfactant systems”. Project taking place at Central Laser Facility, Rutherford Appleton Laboratory. Science and Technology Facilities Council.

Research Project Dissertation FHS of Cell & Systems Biology, Medical Sciences and Neuroscience. Michael Leeming co-supervised with Dr. Christian Eggeling (2014-2015) “Assessing the presence of differential calcium transients under varied T cell activation conditions” University of Oxford. United Kingdom.

Ph.D supervision. Tess Stanly co-supervised with Dr. Christian Eggeling and Dr. David Jackson. (2013-2015) Oxford University. United Kingdom.

Additionally, the lipid distribution and dynamics at the plasma membrane of the Tcell has led to 2 different studies. In one hand we are aiming to understand the difference in packing properties of the lipids and its different dynamical states at the plasma membrane at the Tcell resting state and during activation. On the other hand, we are exploring the different packing properties of the lipids as a function of oxidative stress. For the investigations on the lipid packing; its relation to the cellular oxidative stress, and reactive oxygen species production, we applied a short scientific visit grant to the Polish Ministry of Science. With the money granted we invited a postdoc from Poland, Dr. Kasia Jodko-Piórecka, to perform several experiments challenging the cells to different oxidative stress chemicals. The promising preliminary data will be followed up, upon a second visit in middle of February to our new Facilities.

• **DISSEMINATION ACTIVITIES** (expected length: max. 800 words)

2017- Lector in the Doctoral Training Program for The University of Oxford. Experimental and theoretical course on superresolution microscopy calibration and performance.

2017- Science Week School talks. Talk given at the Europa School. Thames Lane Culham. To primary students (age 5-8)

2017- Coordination, organisation and teaching during the workshop on correlative imaging at the Research Complex in Harwell. “Symposium and Workshop on correlative light, electron, and X-ray microscopy “. 6th-7th and 8th-10th March 2017

2013- Lector in the course “Fundamentals of light microscopy and advance applications”. University of Oxford. Weatherall Institute of Molecular Medicine, United Kingdom.

• Outreach activities: Specify activities aiming at the wide public (for example workshops, summer school weeks, public talks etc.)

Popular articles:

**J. Bernardino de la Serna** “Immunology and Biophysics A conversation with Prof. Francisco Sanchez-Madrid”. Biophysics Magazine of the Spanish biophysical Society. <http://www.uv.es/biophys/sbe/7/PDFsite/ImmunologyAndBiophysics.pdf>

We have organised an annual advance microscopy course together with Micron, the microscopy facility at the Biochemistry and Molecular Biology Department at the University of Oxford. In this workshop, I gave an introductory talk on FCS and FLIM and I was doing hands-on tutorials on FCS.

We have also organised the workshop super-resolution user club, annually sponsored by Leica at different European locations. The meeting we organised was the 4th one and was held in 18th-20th of June 2014.

• Website If the fellow or the Host Institution created a website related to the project, please indicate the address.

The laboratory where I was working designed a common webpage, where I have my own page and where in the news was reported the Marie Curie- Career Integration Grant awarded.

http://www.nano-immunology.org/

<http://www.nano-immunology.org/dr-jorge-bernardino-de-la-serna.html>

http://www.nano-immunology.org/lab-news.html

• LIST SCIENTIFIC CONFERENCES attended and provide details of the exact role of the fellow (papers/ posters presented/talks)

***Oral contributions and invited talks***

**2017**

Invited speaker at the BIOFORUM, University of the Basque Country, Bilbao Spain. November 2017. “Highly-resolved Spatiotemporal Quantitative Spectroscopic and Fluorescence Microscopy. Just another colourful journey across the cell?”.

Invited seminar at Public Health England, Harwell Campus. January 2017. “High-resolved Spatiotemporal Quantitative Spectroscopic and Fluorescence Microscopy- Just another colourful journey across the cell?” J Bernardino de la Serna.

**2016**

Invited speaker at “The Imaging and Advanced Spectroscopic Methods Workshop” and “The African Laser Centre (ALC) student workshop”. November 24-30, 2016. “Lipid and Protein membrane dynamics studies by FCS and STED-FCS” J Bernardino de la Serna.

Keynote Speaker at the “Super-resolution and Lightsheet Workshop with Hands-on” Institute of Molecular Genetics, Prague. October 5-7, 2016.“Lipid and Protein membrane dynamics studies by FCS and STED-FCS” J Bernardino de la Serna.

Invited seminar at MRC Harwell, Mammalian Genetics Unit, Harwell Campus. July 2016. “High-resolved Spatiotemporal Quantitative Spectroscopic and Fluorescence Microscopy- Just another colourful journey across the cell?” J Bernardino de la Serna.

Invited Seminar at the Spanish National Center of Biotechnology. Madrid, 30th May 2016 “High-resolved Spatiotemporal Quantitative Spectroscopic and Fluorescence Microscopy- Just another colourful journey across the cell?” J Bernardino de la Serna.

<http://www.cnb.csic.es/index.php/en/events/previous-events-at-the-cnb/1678-high-resolved-spatiotemporal-quantitative-spectroscopic-and-fluorescence-microscopy-just-another-colourful-journey-across-the-cell?date=2016-05-30-12-00>

Invited seminar at the J. Heyrovsky Institute of Physical Chemistry of the Acdemy of Sciences of the Czech Republic. Prague. 28th April 2016.“*The Tcell early stage of activation at the plasma membrane as revealed by STED microscopy”* J Bernardino de la Serna.

Invited seminar at the London Center for Nanotechnology. University College London, MRC Laboratory for Molecular Cell Biology, 5th April. “*The Tcell early stage of activation at the plasma membrane as revealed by STED microscopy”* J Bernardino de la Serna.

<https://www.london-nano.com/news-and-events/seminars-and-events/seminar-the-tcell-early-stage-of-activation-at-the-plasma>

Invited seminar at the Randall Division of Cells and Molecular Biophysics. Kings College London, 16th February. “*The Tcell early stage of activation at the plasma membrane as revealed by STED microscopy”* J Bernardino de la Serna.

<http://www.kcl.ac.uk/lsm/newsevents/eventrecords/2016/feb/Randall-Seminar-Dr-Bernardino-de-la-Serna.aspx>

Intercollagiate Faculty of Biotechnology (University of Gdańsk – Medical University of Gdańsk, Poland); “Filaggrin utilizes actins to regulate keratinocyte differentiation and cornification during epidermal barrier formation” D. Gutowska-Owsiak\*, J. Bernardino de la Serna, M. Fritzsche, C. Eggeling, and G. Ogg.

**2015**

Polish Society of Experimental and Clinical Immunology (PTIDiK); meeting Gdansk, Poland; “Atopic dermatitis – critical role of filaggrin during formation of epidermal barrier”; *invited lectura* D. Gutowska-Owsiak\*, J. Bernardino de la Serna, M. Fritzsche, C. Eggeling, and G. Ogg.

European Congress of Immunology, Vienna; “Tight interplay of actin cytoskeleton and filaggrin control epidermal differentiation and cornification as revealed by quantitative nanoscopy” D. Gutowska-Owsiak\*, J. Bernardino de la Serna, M. Fritzsche, C. Eggeling, and G. Ogg.

Spanish National Center for Cardiovascular Research invited talk. Miguel Angel Del Pozo’s Integrin Signalling Group. Madrid, December 23rd.

10th European Biophysics Congress. July 18 to 22, Dresden, Germany. “Protein diffusion at the true resting state of T-cells during activation”. J Bernardino de la Serna, M. Fritzshe, V. Chang, M.A. Santos, R.A. Fernandes, D. Waithe, J.H. Felce, M. Assmann, S.J. Davis and C. Eggeling.

**2013**

Physics and Chemistry Departmental invited talk, University Complutense. Madrid. ”Super-resolution optical STED microscopy of biological membranes” J. Bernardino de la Serna. December 19th

***Abstracts and poster* *contributions***

**2017**

Biophysical Society 61th Annual Meeting. New Orleans, Lousiana. February 11-15. “Well-Characterised Time-Gated Detector Photon Flux Resolves the Ultrastructure of DNA-Damage Nuclear Bodies with G-STED Nanoscopy” KL Chan, EG Gonzalez, S Padilla-Parra, J Bernardino de la Serna. Biophysical Journal 112 (3), 141a

Biophysical Society 61th Annual Meeting. New Orleans, Lousiana. February 11-15. “Azobenzene-Cholesterol as a Photoactivator in Biomimetic Membranes: 2. Membrane Structure” C Shen, J Bernardino de la Serna, B Struth, B Klösgen. Biophysical Journal 112 (3), 319a

**2016**

EMBO Conference on Lymphocyte Antigen Receptor Signaling, 3-7 September. Siena (Italy). “On the organisation of LCK in resting T-cells”. A. M. Santos, M. Fritzsche, J. Bernardino de la Serna, F. Schneider, D. Waithe, R.A. Fernandes, M. Assmann, J.H. Felce, S. J. Davis and C. Eggeling.

Radcliffe Department of Medicine Research Day, University of Oxford, ”A life/death control switch in the skin” D. Gutowska-Owsiak\*, J. Bernardino de la Serna, M. Fritzsche, C. Eggeling, and G. Ogg.

Weatherall Institute of Molecular Medicine Research Day, University of Oxford, ”A life/death control switch in the skin” D. Gutowska-Owsiak\*, J. Bernardino de la Serna, M. Fritzsche, C. Eggeling, and G. Ogg.

Biophysical Society 60th Annual Meeting. Los Angeles, California. February 7-11. “T-Cells in Suspension Do Not Show Pre-Clustered LCK”. J Bernardino de la Serna, V T Chang, D Waithe, R A Fernandes, M Fritzsche, A M Santos, D Shrestha, J H Felce, M C Assmann, S J Davis, C Eggeling *Biophysical Journal*. 110 (3), 570a

**2015**

Science Polish Perspectives conference; Cambridge, UK; ”A life/death control switch in the skin” D. Gutowska-Owsiak\*, J. Bernardino de la Serna, M. Fritzsche, C. Eggeling, and G. Ogg.

Mechanisms and Functions of Membrane Compartmentalisation. September 6th to 10th Munster, Germany. “Protein diffusion at the true resting state of T-cells during activation”. J Bernardino de la Serna, M. Fritzshe, V. Chang, M.A. Santos, R.A. Fernandes, D. Waithe, J.H. Felce, M. Assmann, S.J. Davis and C. Eggeling.

10th European Biophysics Congress. July 18 to 22, Dresden, Germany. “Protein diffusion at the true resting state of T-cells during activation”. J Bernardino de la Serna, M. Fritzshe, V. Chang, M.A. Santos, R.A. Fernandes, D. Waithe, J.H. Felce, M. Assmann, S.J. Davis and C. Eggeling.

Biophysical Society 59th Annual Meeting. Baltimore, Maryland. February 7-11. “DPPC monolayers exhibit an additional phase transition at high surface pressure”. C. Shen, J. Bernardino de la Serna, B. Struth and B. Klösgen. *Biophysical Journal* 108 (2), 85a

The 20th European symposium on Ultrasound Contrast Imaging. January 22-23, Rotterdam, The Netherlands. “Changes in the physical properties of lipid membranes interacting with ultrasound-activated microbubbles”. Dario Carugo\*, Erdinc Sezgin\*, Jorge Bernardino de la Serna\*, Marina Kuimova, Christian Eggeling and Eleanor Stride. *(\*co-first authors)*

**2014**

Get Connected’ the annual conference of the Wellcome Trust Centre for Cell-Matrix Research. Manchester, United Kingdom. 10-12th September 2014. ”Hyaluronan and its fragment regulate lymphatic endothelial barrier integrity through LYVE-1 signalling” Ying-jie Wang, Tess Stanly, Danijela Markovic, Jorge Bernardino de la Serna, Daniel Regan-Komito, Suneale Banerji, David R. Greaves and David G. Jackson

 **Project Management (expected length: max. 800 words) Please mention any relevant issue concerning the management of the project and include (if applicable) the progress of compliance with ethics' requirements:**

• Progress of professional re-integration and research career development

During this period, I have been able to manage 1 postdoc research Associate, 1 PhD student and 2 undergrad students.

Since I moved to my new post at the Science and Technology Facilities Council, I have earned a permanent position and I managed several labs and equipment. I deal with departmental administrative tasks and I have written and applied several grants. I have started new collaborations and I have written several articles as senior author.

• **ADDITIONAL GRANTS.** Please mention any additional grants obtained to support the fellow and/or the project and how they support the overall integration (including length, name of funding body, size of grant).

**I have secure personally or in collaboration with my peers several STFC minigrants.**

**Science and Technology Facilities Council short-project Grant (RCUK)**. Collaborative short-term projects; Peer-reviewed Mini-grants (~5.000 £) given by the Science and Technology Facilities Council.

**2017**. -“Characterisation of a novel biosensor for Staufen protein in mRNA decay” (Main applicant L Spagnolo, and J. Bernardino de la Serna, M Martin-Fernandez) Grant# 162300

 -“Uncovering the role of the midbody remnant in primary ciliogenesis (Main applicant J Bernardino de la Serna, M. A. Alonso and M Bernabe-Rubio) Grant# 16230026

 - “Towards a non-invasive lipidomic diagnosis tool for upper airways respiratory diseases: Silane gel

matrices design optimisation”.. (Main applicant P Jones, J Bernardino de la Serna, J.R. Jones) Grant#172301096

- “Super-resolution analysis of ESCRT-III filaments during the late anaphase resealing of the nuclear envelope”. (Main applicant L. Ventigmilia, J Bernardino de la Serna, J Martin-Serrano) Grant#17230101

- “Unravelling the conformation of TIM-1 protein at the cell surface”. (Main applicant E. Garcia Gonzalez, M Zonca, J Bernardino de la Serna, J Casasnovas) Grant#17230086

- “Monitoring tubulin, microtubules formation and dynamics in the presence of anti-cancer drug combretastatin”. (Main applicant S. Botchway, K Müller-Nedebock, J. Bernardino de la Serna, A W Parker, A Ward) Grant# 17230089

- “Exploring hyaluronan – model membrane interaction as a possible mechanism to modulate membrane properties” (Main applicant C. Eggeling, H Martinez-Seara Monne and J Bernardino de la Serna) Grant# 17230087

**2016**. -“Unravelling functional protein cluster stoichiometry and dynamics during the early stage of T cell activation “(Main applicant J Bernardino de la Serna and S Padilla-Parra.) Grant# 16130026

 -“Construction of super-resolution blueprints of DNA repair factories” (Main applicant K-L Chan and J Bernardino de la Serna) Grant# 16130002

-“Investigating the relationship between EGFR structure and phosphatidyl inositol perturbations in the determination of EGFR endocytic fate"(Main applicant L Zanetti-Domingues, J Bernardino De La Serna, L Wang, and M Martin-Fernandez) Grant# 16130038

 - “Optical traps probing and theoretical modelling the confinement of actin cytoskeleton” (Main applicant S. Botchway, K Müller-Nedebock, J. Bernardino de la Serna, A W Parker, A Ward) Grant#16130033

**2015**. -“Membrane lipid peroxidation in T-cells during activation” (Main applicant K Jodko-Piorecka and J Bernardino de la Serna). Grant#15240003

**Esteemed positions**

* Visiting Research Fellow at King’s College London. July 2016-Present. Department of Physics. Faculty of Natural and Mathematical Science. King’s College London. United Kingdom

**Honours**

* Abcam Beta Tester lab for development of New Fluorescent Conjugated Antibodies in live cell imaging
* Academic Editor, PLoS ONE. Since Feb 2017
* Leica Microsystems Laboratory Reference Site in STED super resolution microscopy, Single Molecule Detection microscopy (FCS) and Fluorescence Lifetime Imaging (FLIM) in United Kingdom. (Currently negotiating being a Beta Tester lab in multiphoton and light sheet microscopy)
* Review Editor “Frontiers In” (Physics, Biophysics), Since 2015.
* Editor of a special issue in Immunophysics and Immunoengineering in 2017-2018.

**Awards**

* Cover of the journal “Science Translational Medicine”, Issue of February 10 2016. Sci Trans Med 10;8(325):325
* 5th Prize of the Huygens Imaging Contest, 2015. “Image of a T lymphocyte crawling”. <https://svi.nl/WinnersImageContest2015>
* Back Cover of the ChemPhysChem Journal, Issue of 07/2015. From the paper "Spectral Imaging to Measure Heterogeneity in Membrane Lipid Packing". ChemPhysChem, DOI: 10.1002/cphc.201402794
* Co-author in the Best Poster Award at the Get Connected’ – The annual conference of the Wellcome Trust Centre for Cell-Matrix Research. Manchester, United Kingdom. 10-12th September 2014. ”Hyaluronan and its fragment regulate lymphatic endothelial barrier integrity through LYVE-1 signalling” Ying-jie Wang, Tess Stanly, Danijela Markovic, Jorge Bernardino de la Serna, Daniel Regan-Komito, Suneale Banerji, David R. Greaves and David G. Jackson

**Invited speaker and selected talks**

* Invited speaker at the BIOFORUM, University of the Basque Country, Bilbao Spain. November 2017. “Highly-resolved Spatiotemporal Quantitative Spectroscopic and Fluorescence Microscopy. Just another colourful journey across the cell?”.
* Invited speaker at the “Imaging and Advanced Spectroscopic Methods Workshop” and “The African Laser Centre (ALC) student workshop”. November 24-30, 2016. “Lipid and Protein membrane dynamics studies by FCS and STED-FCS”
* Keynote Speaker at the “Super-resolution and Light-sheet Workshop with Hands-on” Institute of Molecular Genetics, Prague. October 5-7, 2016. “Lipid and Protein membrane dynamics studies by FCS and STED-FCS”
* Invited speaker at the Randall Division of Cells and Molecular Biophysics annual seminar series. Kings College London, 16th February 2016. “The Tcell early stage of activation at the plasma membrane as revealed by STED microscopy”
* 10th European Biophysics Congress selected talk. July 18 to 22, 2015. Dresden, Germany. “Protein diffusion at the true resting state of T-cells during activation”.

• **COLLABORATIONS** Please mention collaborations set up within the Host Institution, and at national as well as international level and describe their impact on the project. Please describe any industrial links and additional funding if appropriate.

INDUSTRIAL & SCIENTIFIC COLLABORATIONS

Adaptaimmune. Jonathan Silk, Milton Science Park. Oxfordshire, United Kingdom.

Abcam, Dr. Gary Dillon. Cambridgeshire, United Kingdom

KaiserSpace, Ramon Nartallo, William Blackler. Harwell Innovation Centre, United Kingdom

Leica Microsystems GmbH. Christoph Thumser. Mannheim, Germany.

NIMA Technology Ltd. Dr Frank Grundfeld. University of Warwick Science Park. Coventry. UK. Design and improvement of Langmuir troughs with special focus on lung surfactant applications. The designed improvement is currently being use for commercial purposes. As recognition, I own one of those equipments valued in aprox. 30.000-35.000 €.

Assistant Prof. Dr. Ilpo Vattulainen, Helsinki University of Technology (TKK), Espoo, Finland

Professor Jesus Perez-Gil, Department of Biochemistry and Molecular Biology, University Complutense of Madrid

Assistant Prof. Dr. Sergi Padilla-Parra, Wellcome Trust Centre for Human Genetics

University of Oxford.

Assistant Professor Dr. Dario Carugo. Department of Bioengineering. University of Southampton.

Prof Chistian Eggeling. and Prof. Graham Ogg. MRC-Human Immunology Unit. University of Oxford.

Prof. Miguel A. Alonso. CBMSO-CSIC. Autonomous University of Madrid. Spain

Prof. Mike Dustin, University of Oxford.

Prof. Luke Lavis, Janelia Research Campus. MTA signed to explore the super-resolution fluorescent dyes developed at his laboratory.

Dr. Musa Mhalanga. University of Cape Town, South Africa.

Prof. Jim Thomas. Inorganic Chmistry Department University of Sheffield

Dr. Lucy Collinson, The Crick Institute, London