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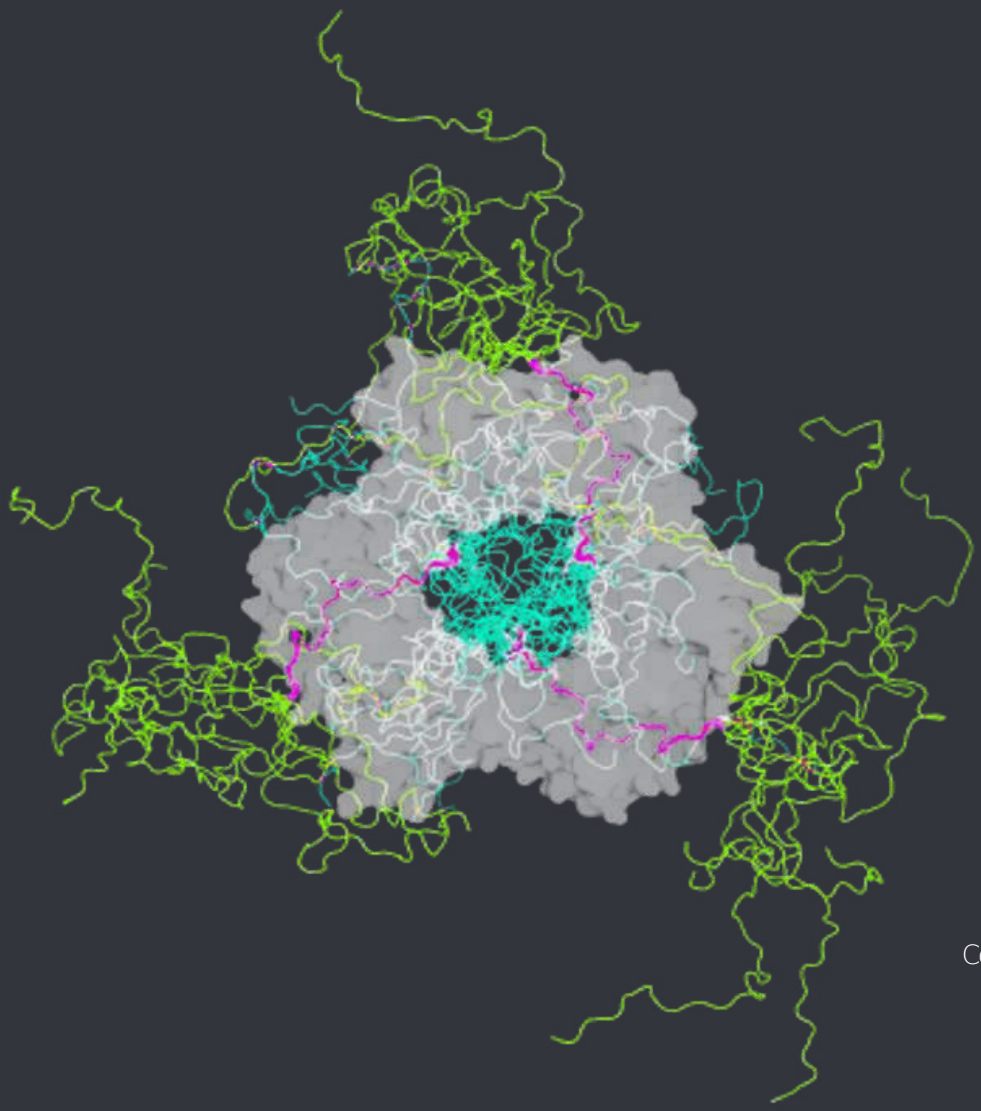

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SBE - Sociedad de Biofísica de España

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Biofísica
SBE Magazine

First words

Biofísica is the new Magazine of the **Sociedad de Biofísica de España (SBE)**. It will be published online and will be archived in a closed format every four months. It is intended mainly as a communication medium for SBE members, who will be informed of major updates *via* a dedicated Newsletter. But any other reader interested in Biophysics is also welcome.

The Magazine contains a few Short **Articles** of three types: Editorials, *beyond* Biophysics and *cool* Biophysics. It also includes a section with **Highlighted Publications** by SBE members, a selection of Topics, like upcoming **Events** (Meetings, Courses, Workshops), **Calls** (for Jobs, Fellowships, Grants), **Awards** and **News** .

Most of **Biofísica** has the format of a Blog, and new entries are inserted as Posts, *categorized* and with assigned Keywords (*tags*) to help you navigate through the magazine content. Any one can add Comments to Articles, Highlighted Papers and some special Posts, which will be displayed after *revision* and *approval* by an editor. We encourage you to participate!

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Biofísica
SBE Magazine

In this issue

Biofísica Magazine

EDITORIAL PRESENTATION

Una nueva era para la SBE

Antonio Ferrer Montiel, UMH (Elche), *Presidente de la SBE*

La SBE nace hace 29 años por la inquietud de grupos importantes de biofísicos españoles que desarrollan su actividad alrededor de la Biofísica Estructural, Celular y de Membranas. Desde entonces la SBE ha ido nutriéndose de nuevos miembros que investigan en prácticamente todos los campos de la Biofísica contemporánea, desde el estudio de Moléculas Aisladas a la Biofísica de Sistemas. A todos ellos la SBE debe su desarrollo actual, tanto en número de socios como en la visibilidad e internacionalización de nuestra sociedad.

La multidisciplinaridad temática y en áreas de conocimiento que ha enriquecido notablemente la SBE, requieren ahora un fortalecimiento de los objetivos que llevaron a su creación; a saber, favorecer la cohesión de sus miembros y divulgar sus avances y contribuciones científicas. Esta labor, que se ha venido logrando con la organización del Congreso Anual, necesita, sin duda, de un impulso renovado para acercar la SBE a sus miembros y a la vez atraer a nuevos socios.

Con el fin de contribuir al logro de estos objetivos, nace **Biofísica**, la revista digital de la SBE, una iniciativa cuatrimestral cuyos retos principales serán:

- Constituir un canal fluido de comunicación entre la SBE y sus socios.
- Mantener a los socios de la SBE informados de las principales noticias y eventos relacionados con la Biofísica.
- Difundir las contribuciones científicas más relevantes de los socios de la SBE.
- Divulgar temáticas de actualidad y tendencias futuras de la Biofísica.
- Constituir un portal atractivo para anuncios específicos por parte de patrocinadores de la SBE

Este proyecto divulgativo es posible gracias al trabajo desinteresado de un Comité Editorial dirigido por Jesús Salgado (ICMol, Universitat de València), que cuenta con la colaboración de Xavier Daura (ICREA, Barcelona), Jorge Alegre Cebollada (CNIC, Madrid) y Teresa Giráldez (ULL, Tenerife). La SBE les está muy agradecida por haber aceptado este desafío, y tiene el absoluto convencimiento de que realizarán una labor excelente, como demuestra este primer número de nuestra revista digital.

Desde la Junta Directiva de la SBE confiamos en que esta iniciativa sea del agrado de todos los

socios y que podamos contar con vuestra participación en la elaboración de los siguientes números. Por supuesto, nace como un proyecto abierto en el que el Comité Editorial y la Junta Directiva tomarán en consideración cuantas sugerencias se nos hagan para mejorar número a número. Esperamos que disculpéis los fallos que seguramente cometeremos en los primeros números, pues, si bien ponemos toda nuestra voluntad y energía en su elaboración, especialmente Jesús, no somos editores profesionales. No obstante, con el tiempo y vuestra ayuda seguro que desarrollaremos un producto de calidad que estreche los lazos entre la SBE y los socios, rejuveneciendo y reforzando nuestra ya madura sociedad.

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Biofísica Magazine

Do we need *another* bulletin?

Presenting Biofísica, the new SBE magazine

Jesús Salgado, *ICMol (Valencia)*

The question of having a periodical publication, *made-by-and-for* the "Sociedad de Biofísica" has come up from time to time in some of our meetings. Nowadays, dozens of such *bulletins* slip into our e-mail boxes, in the form of more-or-less classical magazines or simple one-page newsletters, sent by Societies, Institutions, Journals or Companies. *Do we really need another one*?

Certainly, we might not need it... Although, it may be welcome if it is a *useful* mechanism to communicate within our Spanish Biophysics community, events, news and comments of our very specific interest. It may be welcome if such an information is offered in an attractive, dynamic, light-weight format, *easily accessible*. It may also be welcome if the *receptors* of the bulletin, the SBE members, can as well participate, by *transmitting* their own articles, comments and announcements of news and events. And it won't be bad after all, if it turns out to be an *attractive vehicle* for limited advertising by sponsors, which may help us financing our activities. All that is a big challenge! Fortunately, I have the privilege to count with the invaluable collaboration of Jorge Alegre, Xavi Daura and Teresa Giráldez, whose ideas and common-sense advise will help me to (try to) put it into practice.

Modern communication is evolving very rapidly and offers many opportunities for easy and efficient distribution of information. We have chosen to use the flexibility of electronic formats to create a modest online *magazine* with some *blog* features: Biofísica. It will be freely available through the internet, hosted in a registered domain (biofisica.info) and will contain fixed sections with Articles, Publication Highlights, Announcements (like Events, Positions and Prizes) and News. As you are seeing in this first issue, we have chosen English as the main language of the magazine, but with the possibility of using Spanish, specially for Articles and depending on the topic and preference of the Author.

We cannot promise that this will be a worthy bulletin, but we will do our best for that, and we hope that you enjoy it!

Each number (with a total of *three per year*) will be available *live* on the magazine web site until the next number is issued. During the four moths life-time of a current issue, all content, except for the Articles, will be actualized and readers will be able to comment or debate on the Articles and some other special posts. At the appearance of each new issue, the previous one will be frozen and archived on the web site in *pdf* format, and this will be conveniently announced to SBE members via e-mail through a *special* Newsletter.

We can neither promise nor guaranty that this will be a worthy bulletin, but we will do our best to achieve that, and we really hope that you find it useful and enjoyable! Suggestions and criticisms are very much welcome.

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Biofísica Magazine

BEYOND BIOPHYSICS

La Medicina y la Biofísica

2 Comments

Conversación con Pedro García Barreno

Jorge Alegre Cebollada, *CNIC (Madrid)*

> *El médico y académico comparte su visión acerca de la ciencia de frontera y nos transmite su consejo para la Biofísica: "Quítenle el nombre".*

Los biofísicos estamos orgullosos del carácter radicalmente interdisciplinar de nuestras investigaciones. En la Sección *beyond* Biophysics mostraremos cómo la Biofísica se relaciona con otras áreas del conocimiento. Con este artículo inaugural exploramos cuáles son los vínculos entre la Biofísica y la Medicina. Para ello, he contado con la fortuna de conversar con Pedro García Barreno, médico cirujano, catedrático emérito de la Facultad de Medicina de la Universidad Complutense, y miembro de las Reales Academias Española y de Ciencias Exactas, Físicas y Naturales, entre otros méritos y distinciones. Nuestra conversación me lleva a concluir que la interdisciplinariedad no puede ser una meta; menos aún ante los desafíos sociales y científicos actuales. "Somos estudiosos de problemas, no de disciplinas", dice el académico parafraseando a Karl Popper. Este lema está presente a lo largo de toda nuestra charla.

La Biofísica como transciencia. Acudo al despacho de García Barreno en el Instituto de España, la institución que coordina los esfuerzos de las ocho Reales Academias nacionales. El vetusto edificio sede del Instituto es un fantástico lugar para reflexionar acerca de Ciencia, Filosofía, Historia o lo que surja. Y dado el extenso y variado conocimiento de mi interlocutor, me lo tomo como una oportunidad para aprender tanto como me sea posible. García Barreno ve la Biofísica como "lo que está debajo de todo", un excelente representante de uno de sus conceptos favoritos, la transciencia. "Transciencia es la expresión de una estrategia de abordar los problemas del mundo como una prioridad", afirma. No tarda mucho en transmitirme su admiración por los que en su opinión son los primeros biofísicos modernos: Bohr, Schrödinger, Delbrück, Kendrew, Perutz, etc. Todos ellos fueron pioneros que asumieron el reto de entender problemas biológicos usando principios prestados de la Física.

La Biofísica y el avance de las técnicas médicas. Para García Barreno, la Biofísica está detrás de grandes avances en la práctica médica en general y quirúrgica en particular. Cita como ejemplos las técnicas de imagen, la fibra óptica, los bisturís de alta energía, o los órganos artificiales. En su opinión, en todos estos avances la Biofísica ha jugado y juega un papel fundamental. Él mismo vivió en primera persona esta fructífera relación durante su etapa como director del Hospital Gregorio Marañón, cuando puso en marcha una unidad avanzada de imagen cardiaca. El académico pronostica que todavía hay grandes avances por llegar, consecuencia de desarrollos biofísicos más recientes, como la microscopía óptica de alta resolución, galardonada con el Premio Nobel de Química de 2014. Bromeando, pero sólo en parte, se aventura a proponer que "la cirugía es un arte que desaparecerá en poco tiempo" como consecuencia de todos esos avances.

La interdisciplinariedad no puede ser una meta. "Somos estudiosos de problemas, no de disciplinas", dice el académico parafraseando a Karl Popper.

La relación entre la Biofísica y la Medicina en España. En nuestra conversación, sale a menudo a colación que en España la comunicación entre disciplinas es difícil. Considera que en nuestro país faltan centros con masa crítica que faciliten la discusión entre personas con distinta experiencia. Y pone como ejemplo a imitar el Santa Fe Institute de Nuevo México, donde durante 30 años se ha posibilitado que pensadores con distinta formación interaccionen para intentar solucionar cuestiones complejas, como el comportamiento humano o la dinámica de la materia viva, y todo ello dejando a un lado las disciplinas tradicionales. Considera que el problema al que nos enfrentamos en España no viene tanto de la falta de recursos como de la voluntad de acercarnos a otros nichos del saber. Por ejemplo, en Estados Unidos es fácil encontrar estudiantes de medicina con interés por técnicas biofísicas; en España eso es mucho más raro. A los pocos que hay, el catedrático emérito les recomienda saltarse algunas de sus clases de la Facultad de Medicina, y acudir en su lugar a otras facultades: Matemáticas, Física, etc. Aboga por la especialización, pero siempre manteniendo la mente abierta para poner la experiencia adquirida en un contexto más amplio.

Pedro García Barreno

El futuro. Según García Barreno, no podemos cometer el error de convertir la interdisciplinariedad en nuevas disciplinas. ¡Las disciplinas han muerto! Cita como ejemplo a seguir a Erez Lieberman Aiden, un científico de éxito que sin embargo no pertenece a ninguna disciplina, sino a los problemas que decide estudiar. De hecho, defiende la necesidad de un cambio estructural de la Universidad, en el que las facultades desaparezcan y dejen paso a unidades de investigación

enfocadas hacia problemas concretos. En lo que respecta a la Biofísica, pronostica que su contribución será clave para avanzar en los retos científicos actuales, como la Biología Sintética, el Conectoma Cerebral, o la Ingeniería de la Biosfera. Sin embargo, también advierte del peligro al que se enfrenta: convertirse en una disciplina más. De hecho, su recomendación es que abandonemos el término Biofísica. "El peligro de las palabras es que tienen mucha fuerza y nos encorsetan". Y concluye: "Los biofísicos sois más que eso".

Jorge Alegre Cebollada

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Comments 2

ÁLVARO MARTÍNEZ DEL POZO 22/01/2015 at 5:27 pm

Si las "disciplinas han muerto", ¿por qué hay que seguir hablando de nanociencia, biotecnología, biología sintética o cualquiera de las ómicas que se nos ocurran? ¿No son todo esto nombres que determinados grupos de investigación han puesto de moda para poder tener su particular campo de acción? ¿No son sino estrategias para excluir a posibles competidores por las escasas fuentes de financiación existentes? ¿No son sino simplemente nuevas aproximaciones tecnológicas a problemas antiguos, sobradamente conocidos (los problemas, no las soluciones)?

Jorge 24/01/2015 at 11:10 pm

No nos dejemos obnubilar por los nombres y analicemos siempre al problema científico! Totalmente de acuerdo, Álvaro.

Biofísica Magazine

COOL BIOPHYSICS

Super-resolution optical nanoscopy gets the 2014 Nobel Prize in Chemistry

Maria F. Garcia-Parajo, *ICFO, ICREA (Barcelona)*

Optical microscopy is without any doubts the most important imaging tool for biologists. Unfortunately, Ernst Abbe's nineteenth century formulation of the resolution limit in microscopy let generations of scientists believe that optical resolution at the nanometer scale was impossible. Remarkably, within **2004** and **2006** several optical techniques were invented and the diffraction limitation was overcome! In October **2014**, the Nobel Prize in Chemistry was awarded to W. E. Moerner, E. Betzig, and S. W. Hell for the development of super-resolution fluorescence microscopy. The jury members stated that super-resolution nanoscopy...

> *...is expected to revolutionize biology and medicine allowing for realistic, quantitative descriptions at nanoscale resolution of the dynamics of the complex, multidimensional molecular biological processes that define the phenotypes of all life forms.*

In here we briefly summarize how these forms of super-resolution nanoscopy work, starting with a short description of the diffraction limit of light.

The diffraction limit of light

Towards the end of the nineteenth century Ernst Abbe and Lord Rayleigh formulated what is commonly known as the diffraction limit for microscopy. Roughly speaking, this limit states that it is impossible to resolve two elements of a structure which are closer to each other than about half the wavelength (**λ**) of the light used for observation in the lateral (x,y) plane, and even further apart in the normal (z) direction. The immediate consequence of the diffraction limitation is that it is not possible to focus a laser beam to a spot of dimensions smaller than about **λ**/2. At visible wavelengths (**λ**= 470-670 nm) the maximum optical resolution one can obtain is thus between 250-350 nm. However, as many structures in Nature, including biological objects, have dimensions much smaller than these values, it has been impossible until recently to visualize them in the natural context of living cells. The major breakthrough of super-resolution techniques is that they

allow the capture of images with an *apparent resolution* higher than the diffraction limit. Curiously enough, the techniques that warranted the Nobel Prize in Chemistry do not really break the diffraction limit of light!

Breaking the diffraction limit

Super-resolution techniques can be classified into two broad categories, true super-resolution techniques, which capture information contained in evanescent waves, i.e., in the near-field regime, and functional super-resolution techniques, which work in the conventional far-field regime and use clever experimental techniques and known properties of fluorescent emitters to reconstruct a super-resolution image.

Curiously enough, the techniques that warranted the Nobel Prize in Chemistry do not really break the diffraction limit of light!

Within the *true* super-resolution techniques, the most conceptual way to break the diffraction barrier is using a light source and/or a detector with nanometer dimensions. In fact, diffraction is truly a far-field effect: The light from an aperture is the Fourier transform of the aperture in the far-field. In the near-field, this is not necessarily the case. *Near-field scanning optical microscopy* (NSOM) is a technique that funnels light through a tiny tip of a pulled fiber — and the aperture can be on the order of tens of nanometers. When the tip is brought to nanometers away from an object, the resolution is limited not by diffraction but by the size of the tip aperture, and an image can be built by raster scan of the tip over the object surface.

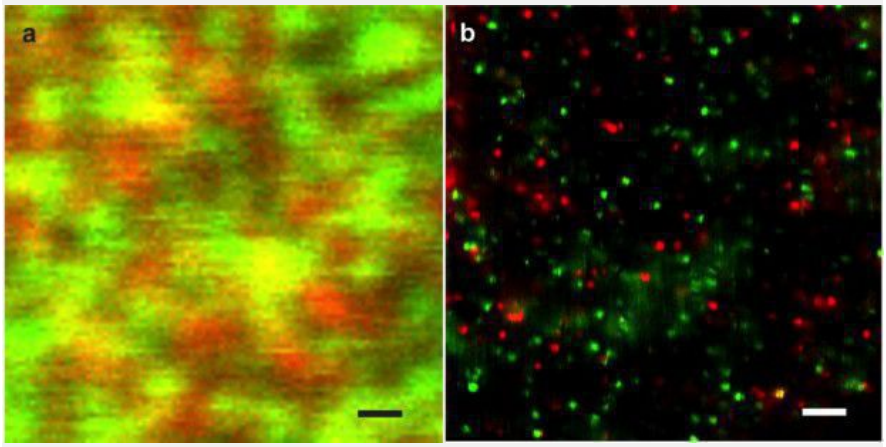

Figure 1. a) Confocal image of two different types of fluorescent molecules (red & green emission). The diffraction limit of confocal does not allow discrimination of individual molecules so that the image appears blurred. **b)** Dual color super-resolution NSOM image of the same sample using a photonic antenna. Each colored spot corresponds to an individual molecule. Optical resolution is 20 nm. Scale bars are 1um. Published in: Mivelle M, van Zanten TS, Garcia-Parajo MF. "Hybrid photonic antennas for subnanometer multicolor localization and nanoimaging of single molecules". *Nano Lett*, **2014**, 14: 4895.

Unfortunately NSOM suffers from the low light throughput of the illumination source. Moreover, it is technically challenging to implement, so that its applicability to the biological domain has remained quite limited. On the positive side of the balance and as a truly super-resolution technique, NSOM does not rely on the fluorescent properties of emitters, providing quantitative information at the nanometer scale. Subsequent advancements from the nanophotonics field, and in particular the use of photonic antennas, can overcome the

main limitation of light throughput associated with NSOM. Indeed, real 20 nm optical resolution and localization accuracies at the sub-nanometer level have been recently demonstrated by engineering optical antennas at the apex of optical fibers (see **Figure 1**).

Super-resolution in the far-field regime

Functional super-resolution optical techniques work in the far-field regime and as such are per-se diffraction limited. How can one thus obtain a super-resolution image if diffraction still dominates? The trick is to combine standard far-field optics with careful manipulation of the photo-physical properties of the fluorescence markers used to label the sample. No wonder then, why the Nobel Prize was given in Chemistry and not in Physics.

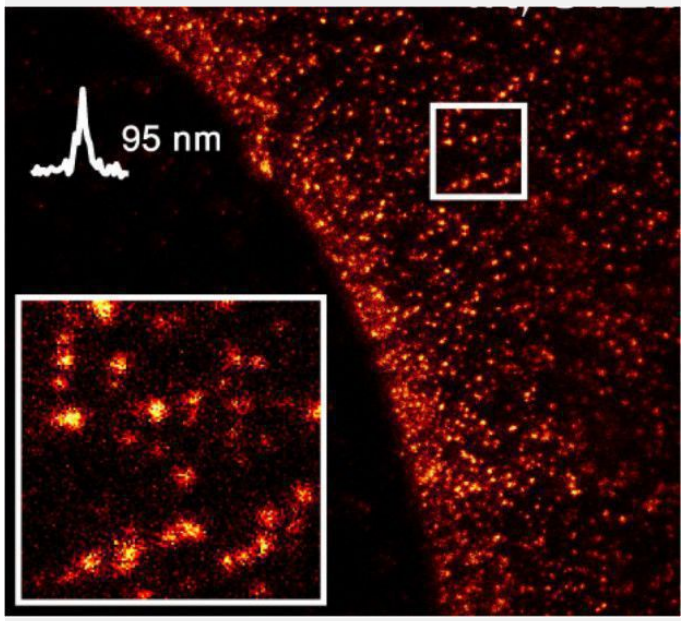

Figure 2. Super-resolution STED image of the pathogen recognition receptor on the cell membrane of an immature dendritic cell. Resolution is 95 nm. Published in: Torreno-Pina JA, Castro B, Manzo C, Buschow S, Cambi A, Garcia-Parajo MF. "Enhanced receptor-clathrin interactions induced by N-glycan mediated membrane micropatterning". *Proc Nat Acad Sci USA*, **2014**, 111: 11037.

> **The trick is to combine standard far-field optics with careful manipulation of the photo-physical properties of the fluorescence markers used to label the sample.**

In general terms, functional super-resolution techniques rely on the controlled switching of the sample fluorescence emission in time, either spatially, as conceived in *stimulation emission depletion* (STED) nanoscopy, or *stochastically* as implemented in single molecule localization methods. Stefan Hell (one of the Nobel winners) and colleagues conceptually introduced STED more than a decade ago. The technique is based on creating a nanometric optical region by first exciting fluorophores to an excited state over a diffraction-limited region using a pulsed laser. A second pulsed laser illuminates the sample with a doughnut-shape like pattern, in a wavelength that depletes the excited state of the fluorescent molecules back to the ground state. Fluorescence is effectively detected only from the hole of the doughnut, and the final spot size can be tuned to balance resolution against signal. The overlapped excitation and depletion beams are then raster scanned over the sample, delivering images with resolutions typically between 30 to 80 nm (see **Figure 2**).

Single molecule localization methods on the other hand, rely on the stochastic on-off switching of individual molecules. The essence of the method is allowing only a subset of fluorescent molecules to be photoactive at a given time and ensuring that the nearest-neighbor distance between active

molecules is larger than the diffraction limit. Methods that make use of this principle are *photoactivatable localization microscopy* (PALM/FPALM) and *stochastic optical reconstruction microscopy* (STORM). The basic premise of both techniques is to fill the imaging area with many dark fluorophores that can be photoactivated into a fluorescing state by a flash of light. Because photoactivation is stochastic, only a few, well separated molecules "turn on." Then *Gaussians are fit to their point spread functions* (PSF) to high precision. After the few bright dots photobleach, another flash of the photoactivating light activates random fluorophores again and the PSFs are fit of these different well-spaced objects. This process is repeated many times, building up an image molecule-by-molecule. Because the molecules were localized at different times, the "resolution" of the final image can be much higher than that limited by diffraction. The main difference between PALM and STORM resides on the type of fluorophores used for photoactivation: PALM relies on autofluorescent proteins, while STORM uses organic switchable dyes. The ascertainable localization accuracy depends strongly on the total number of photons being detected and can be as high as 10 nm (**Figure 3**).

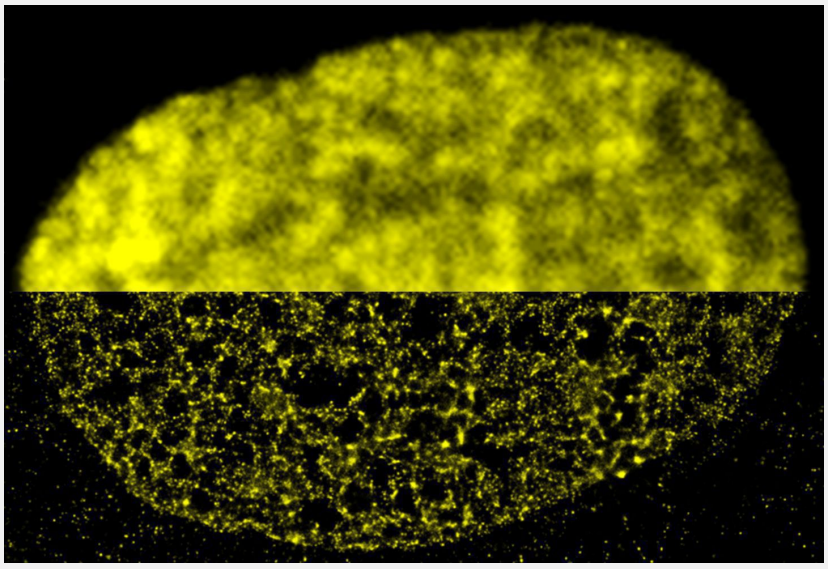

Figure 3. Comparison of wide-field (upper) and STORM (lower) images of the core histone protein H2B in an intact human fibroblast nucleus. Image courtesy of Ricci MA, Manzo C, Garcia-Parajo MF, Lakadamyali M, Cosma MP, at ICFO, Barcelona (Spain).

Two major ingredients have been key to the development of single molecule localization methods. First, the capability to detect individual molecules; Second, their control in terms of on-off switching. Both E. Betzig and W. E. Moerner (Nobel awardees) set the floor for the development of these techniques. Already in **1993** Betzig demonstrated that individual fluorescent molecules could be detected at room temperature using NSOM. One year later, the detection of individual molecules was also demonstrated using less complicated optical techniques, such as confocal or wide field microscopy. However, molecules could only be detected at the single level provided that they were physically separated by distances larger than the diffraction limit of the microscope.

W.E. Moerner who had already demonstrated the detection of individual molecules at cryogenic temperatures, made a major discovery in **1997**: Fluorescent molecules, and in particular, autofluorescent proteins do not emit their photons in

Moerner made a major discovery in 1997: The emission of photons by fluorescent molecules is interleaved with dark periods

a stable fashion. Instead their emission is interleaved with dark periods where no fluorescence is detected. This on-off behavior is known as blinking. The next challenge that led to the final development of super-resolution based on localization of individual molecules was the control of these on-off switching events. In **2006** two separate papers appeared almost simultaneously: both E. Betzig and S. Hess succeeded on controlling the on-off switching of autofluorescent properties and invented PALM. One year later, the group of X. Zhuang managed to control the on-off switching of fluorescent dyes, leading to the invention of STORM. One might really wonder why S. Hess and X. Zhuang did not share the Nobel Prize together with Hell, Betzig and Moerner ...

A short history with a promising future

As stated by Prof. Ehrenberg, member of the Nobel Committee for Chemistry,

> *The history of super-resolved fluorescence microscopy is short. The ensemble-fluorophore STED-microscopy was implemented in the year 2000 and single-fluorophore based methods in the year 2006. In spite of this, the rapidly developing techniques of super-resolved fluorescence microscopy are already applied on a large scale in major fields of the biological sciences, like cell biology, microbiology and neurobiology. At this point there is all reason to forecast that this development, already producing hosts of novel and previously unreachable results, will accelerate over the next decades.*

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See: Official Web site for the Nobel Prize:http://www.nobelprize.org/nobel_prizes/chemistry/laureates/2014/

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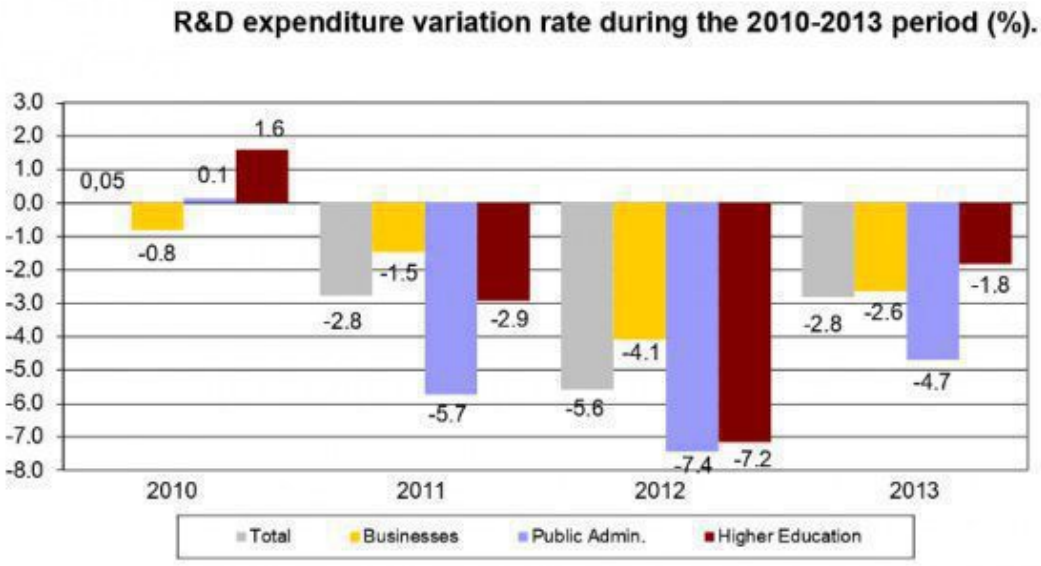
Biofísica Magazine

COMMENTARIES

"Paisaje después de la batalla"

The crude reality of Spanish R&D investment in period 2010 – 2013



Jesús Salgado, *ICMol (Valencia).*

> *The crudest consequence is the reduction of the number of Scientists employed: 11,429 less (8.5%) than in 2010, leaving the rate of R&D Scientists in Full Time Equivalent (FTE) in a weak 0.72% of the total employed population in Spain (1.19%, considering all R&D personnel). According to Eurostat 2009 edition, in 2003-2005 the rate of R&D personnel (head count) in EU-27 was 1.45 %. For the case of Spain this rate was 1.49% in the same period.*

The Instituto Nacional de Estadística (INE) has just published today the figures of R&D investment in 2013 (definitive results). The coldness of numbers speak by themselves. The expenditure dropped dramatically with respect to 2012, both globally (-2.8%) and by all evaluated economic sectors: Business Enterprise Sector (-2.6%), Public Administration (-4.7%) and Higher Education (-1.8%). There are, however, large differences between Autonomous Communities within Spain. Thus, while the reduction reached more than -12% in Castilla-León, Cantabria and Castilla-La Mancha, Madrid showed almost no change (~0%) compared to 2012. Extermadura was the only Region increasing the R&D effort, by +0.9%.

The total expenditure is the lowest since 2006! These figures correspond to a 1.24% of the Gross Domestic Product (GDP), while the average in the EU is ~2%. There are also large differences between Autonomous Communities: Top cases are País Vasco (2,09%), Navarra (1,79%), Comunidad de Madrid (1,75%) and Cataluña (1,50%), in contrast to Baleares (0,33%), Canarias (0,50%) and Castilla-La Mancha (0,53%).

But the crudest consequence is the reduction of the number of Scientists employed: 11,429 less (8.5%) than in 2010, leaving the rate of R&D Scientists in Full Time Equivalent (FTE) in a weak 0.72% of the total employed population in Spain (1.19%, considering all R&D personnel). According to Eurostat 2009 edition, in 2003-2005 the rate of R&D personnel (head count) in EU-27 was 1.45 %. For the case of Spain this rate was 1.49% in the same period.

More information

- See the full report from **INE** *in English* and *in Spanish*.

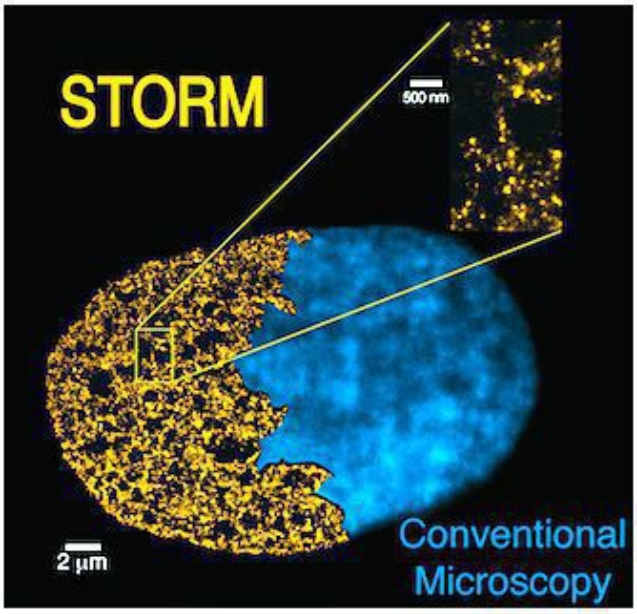
Biofísica Magazine

COMMENTARIES

A Super-resolution View of Nucleosome Organization in Living Cells

The link between genome packaging and cell pluripotency

Commentary to *Chromatin Fibers Are Formed by Heterogeneous Groups of Nucleosomes In Vivo* (Cell, 160: 1145)



Carlo Manzo, *ICFO (Barcelona)*.

The structure of chromatin inside the cell nucleus controls the regulation of gene expression, by impeding or permitting access of transcriptional factors to the genes. The current textbook picture of chromatin, based on *in vitro* or indirect measurements, postulates a hierarchical grouping of nucleosomes into compact and regular fibers. Looking at the details of this organization inside cell nuclei has so far been challenged by a number of limitations, such as the limited resolution of conventional microscopy techniques, and the invasiveness or lack of specificity of alternative approaches.

Through a fruitful collaboration involving biologists at the Centre for Genomic Regulation – CRG and physicists at the Institute of Photonic Sciences – ICFO, we could overcome these constraints and reveal the arrangement of nucleosomes *in vivo* with unprecedented resolution. By means of **STORM**, one of the super-resolution techniques for which the Nobel Prize in Chemistry has been

awarded in 2014, we have visualized the organization of histone proteins in the nucleus of living mammalian cells with a resolution of 20 nm. The combination of super-resolution microscopy with statistical image analysis and computer simulations has further allowed us to quantify the nucleosomes packaging at the nanoscale.

We have found that the nucleosomes are structured in heterogeneous groups (called ***clutches*** for their similarity to "egg clutches") displaying a broad distribution of composing units, sizes and densities. Importantly, the comparison of this organization in stem and somatic cells shows that these properties are correlated with the degree of pluripotency, i.e. the cell propensity to differentiate.

Looking at the details of chromatin organization inside cell nuclei has so far been challenged by a number of limitations, such as the limited resolution of conventional microscopy, invasiveness or lack of specificity

These findings provide a closer look at the chromatin architecture and open new possibilities for single cell screening by nucleosome arrangement, which might be useful to identify cell "stemness" as well as for cancer cell detection. In spite of these advances, **several challenges still remain**, such as the direct visualization of DNA structure and dynamics in living cell nuclei, and will require improvement in fluorescent probe design and fast imaging technology.

More information

- Publication in Cell: Chromatin Fibers Are Formed by Heterogeneous Groups of Nucleosomes In Vivo.
- Video Abstract: Nucleosome Clutches.
- Reprogramming and Regeneration Group at CRG, Barcelona (Spain).
- AFIB Group at ICFO, Barcelona (Spain).
- Single Molecule Biophotonics Group at ICFO, Barcelona (Spain).

Biofísica Magazine

COMMENTARIES

Happening Now, at the BPS Meeting

About the *Biophysical Society Blog*

Jesús Salgado, *ICMol (Valencia)*.

You are probably now like me, seated at your desk and curious about what happens these days in the Baltimore BPS Meeting (February 7 – 11, 2015). A group of enthusiastic young Guest Bloggers volunteer to bring us Fresh News from this top-of-the-calendar event through the Biophysical Society Official Blog.

Some of the posts are designed to make life easier for Meeting attendees around the Conference place. But you can also find lively reports about impressive Talks, impacting Posters and novelties in Biophysics.

See here some examples:

Philip Fowler, a Postdoctoral Researcher in the Department of Biochemistry at the University of Oxford, tells us about Klaus Schulten's "National Lecture":

> ***"Yes! Yes! But why? But why?"***. *This was what Klaus Schulten heard from an experimental colleague after he had told him what he'd found and it neatly highlights one the key advantages of molecular simulation: "It doesn't only agree with the experiment, it tells you more".*

Latest posts from

BIOPHYSICALSOCIETY

- Correlating Tissue Architecture with Tissue Mechanics
  05/05/2015
- Earth Day: Biophysics Research on Biofuels
  22/04/2015
- The Rich Phase-Transition Kinetics of Inter-Leaflet Coupling in Bilayers
  21/04/2015

Satchal Erramilli, a 6th year PhD student in Cynthia Stauffacher's lab at Purdue University, shares his experience with Platform and Poster presentations. I give you a scketch of his report (you can read it complete *here*):

> *Obviously, they are very different experiences [... ...] I've never practiced a poster presentation, but I spent days poring over my slides for the platform talk, rehearsing and then re-rehearsing it again and again to perfect my timing, my transitions, and my tone...*

Shannen Cravens, 4th year PhD student at Johns Hopkins working for James Stivers, chose to tell us about Free Resources for Improved Science Education. And, why not .... about A local pub named after paradise. Perhaps is worth, for your next visit to Batimore.

There are many more interesting posts about specific topics being presented in the meeting: Ebola virus, DNA Nanomechanics, Progress in electron microscopy, ...

Live reporting on big Scientific Meetings is a fantastic idea to bring these events to larger audiences, **but *do these initiatives really work*?** They require the compromise and the time of a crew of active bloggers, and need to be really attractive (by interest and usefulness of reports). We will keep an eye to see how far this can go for the BPS Blog.

More information

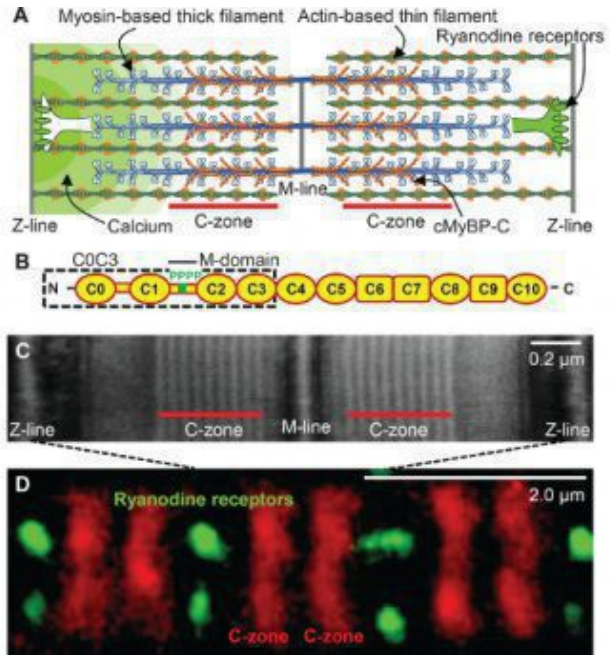
- Here is the Link to the Biophysical Society Official Blog.
- You can find the **latest posts**, published in the Biophysical Society Blog in the **pale-yellow box** included in this page.

Biofísica Magazine

COMMENTARIES

At the heart of the sliding filaments

Commentary to *Myosin-binding protein C corrects an intrinsic inhomogeneity in cardiac excitation-contraction coupling* (Previs, et al., Science Advances, 1: e1400205).



Jorge Alegre-Cebollada, *CNIC (Madrid).*

The sarcomere is a fascinating example of a micrometer-size machine whose activity is exquisitely organized to sustain functional contraction of muscles. The essential components of sarcomeres are myosin molecular motors, assembled in thick filaments, and actin thin filaments. During contraction, thick filaments slide on thin filaments. This sliding filament hypothesis was proposed more than 60 years ago and essentially has remained unchallenged over the decades. However, there are key aspects of sliding filament mechanism that remain not clearly understood. For instance, the model assumes that contraction is homogeneous along the whole region where filaments overlap. In a recent paper, Previs, *et al.* propose a new mechanism that ensures contraction homogeneity involving a key regulatory protein, myosin-binding protein C (MyBP-C) [1].

In order to couple contraction to electric signals, the filament sliding is only allowed when Ca2+ ions are released from specialized reservoirs (the sarcoplasmic reticulum) into the sarcomeres. Ca2+ binding to regulatory proteins of the thin filament allows the myosin motors to interact with actin, enabling myosin-generated powered strokes, that finally result in filament sliding. However, using super-resolution microscopy Previs, *et al.* show that the location of the Ca2+ reservoirs is such that

the release of Ca2+ is not homogeneous along the sarcomere (see featured Figure). In other words, the concentration of Ca2+ is higher close to the Ca2+ releasing channels, which would induce higher contractility at that region of the sarcomere. The new model proposes that this potential inhomogeneity is corrected by the presence of MyBP-C in the C-zone, exactly distal to the Ca2+ releasing channels. At this location, MyBP-C would enable activation of thin filaments at lower Ca2+ concentrations.

Mutations in the cardiac isoform of MyBP-C are the most prevalent cause of Hypertrophic Cardiomyopathy (HCM), a potentially devastating disease of the heart that is responsible for most cases of sudden cardiac death [2]. However, very little is known regarding how mutant MyBP-C proteins lead to disease. The results presented by Previs, *et al.* lead to the proposal that failure to ensure homogeneous contractility may be a pathological mechanism inducing HCM.

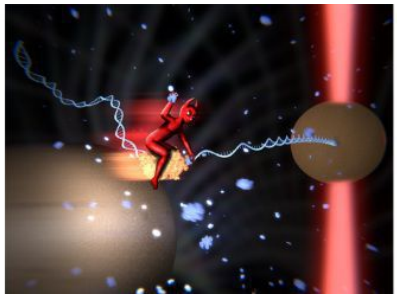
References

1. Previs MJ, Prosser BL, Mun JY, Previs SB, Gulick J, ... and Warshaw DM. "Myosin-binding protein C corrects an intrinsic inhomogeneity in cardiac excitation-contraction coupling". *Science Advances*, **2015**, 1: e1400205. doi:10.1126/sciadv.1400205.
2. Harris SP, Lyons RG and Bezold KL. "In the thick of it: HCM-causing mutations in myosin binding proteins of the thick filament". *Circ Res*, **2011**, 108: 751. doi:10.1161/CIRCRESAHA.110.231670.

Biofísica Magazine

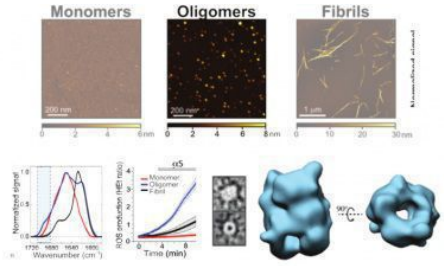
CATEGORY: HIGHLIGHTED

"Papers of the Month": Selected Publications by SBE members



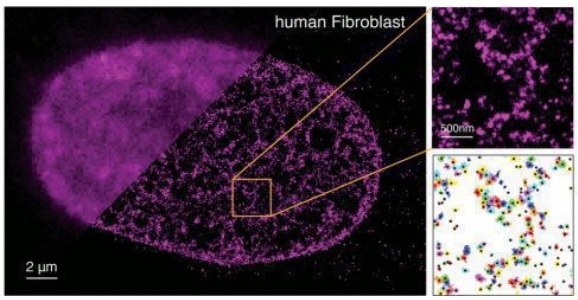
Morin...Ibarra {Nucleic Acids Res 43: 3643}

Mechano-chemical kinetics of DNA replication: identification of the translocation step of a replicative DNA polymerase Morin JA, Cao FJ, Lázaro JM, Arias-Gonzalez JR, Valpuesta JM,.JM, Carrascosa JL, Salas M, Ibarra B. Nucleic Acids Res. 2015 April; 43:3643.



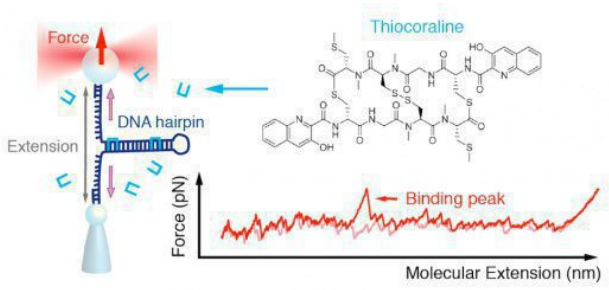
Chen...Cremades {PNAS 112: E1994}

Structural characterization of toxic oligomers that are kinetically trapped during α-synuclein fibril formation Chen SW, Drakulic S, Deas E, Ouberai M, Aprile FA, Arranz R, Ness S, Roodveldt C, Guilliams T, De-Genst EJ, Klenerman D, Wood NW, Knowles TP, Alfonso C, Rivas G, Abramov AY, Valpuesta JM, Dobson CM, Cremades N. Proc Natl Acad Sci USA. 2015 April; 112:E1994



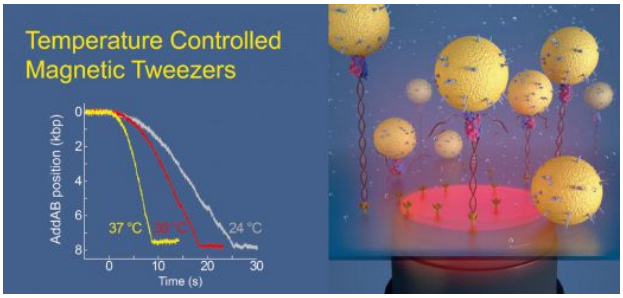
Ricci...Cosma {Cell 160: 1145}

Chromatin fibers are formed by heterogeneous groups of nucleosomes in vivo. Ricci MA, Manzo C, García-Parajo MF, Lakadamyali M, Cosma MP. Cell. 2015 March; 160:1145.



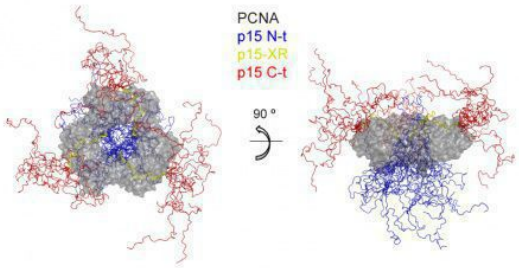
Camunas-Soler...Ritort {Nucleic Acids Res 43: 2767}

Single-molecule kinetics and footprinting of DNA bis-intercalation: the paradigmatic case of Thiocoraline. Camunas-Soler J, Manosas M, Frutos S, Tulla-Puche J, Albericio F, Ritort F. Nucleic Acids Res. 2015 March; 43:2767.



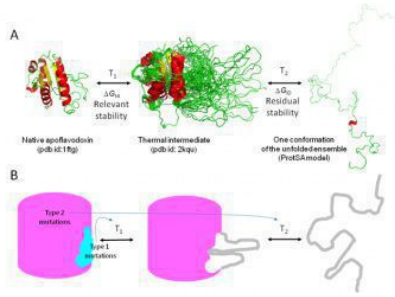
Gollnick...Moreno-Herrero {Small 11: 1273}

Magnetic tweezers: probing DNA helicase kinetics with temperature-controlled magnetic tweezers. Gollnick B, Carrasco C, Zuttion F, Gilhooly NS, Dillingham MS, Moreno-Herrero F. Small. 2015 March; 11:1273.



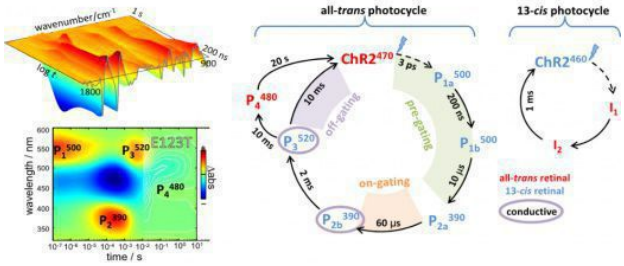
De Biasio...Blanco {Nat Commun 6:6439}

Structure of p15(PAF)-PCNA complex and implications for clamp sliding during DNA replication and repair. De Biasio A, de Opakua AI, Mortuza GB, Molina R, Cordeiro TN, Castillo F, Villate M, Merino N, Delgado S, Gil-Cartón D, Luque I, Diercks T, Bernadó P, Montoya G, Blanco FJ. Nat Commun. 2015 March; 6:6439.



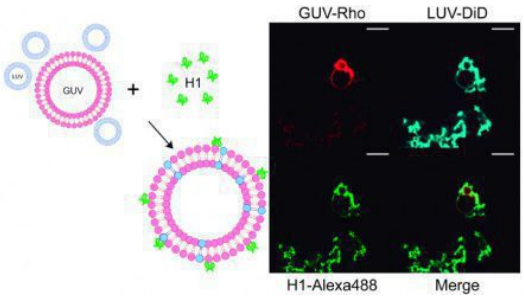
Lamazares...Sancho {Sci Rep 5: 9129}

Rational stabilization of complex proteins: a divide and combine approach. Lamazares E, Clemente I, Bueno M, Velázquez-Campoy A, Sancho J. Sci Rep. 2015 March; 5: 9129.



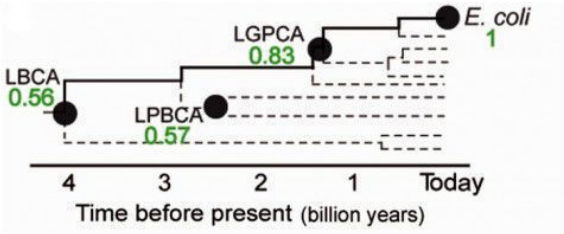
Lorenz-Fonfria...Heberle {JACS 137: 1850}

Pre-Gating Conformational Changes in the ChETA Variant of Channelrhodopsin-2 Monitored by Nanosecond IR Spectroscopy. Lórenz-Fonfría VA, Schultz BJ, Resler T, Schlesinger R, Bamann C, Bamberg E, Heberle J. J Am Chem Soc. 2015 Feb.; 137: 1850.



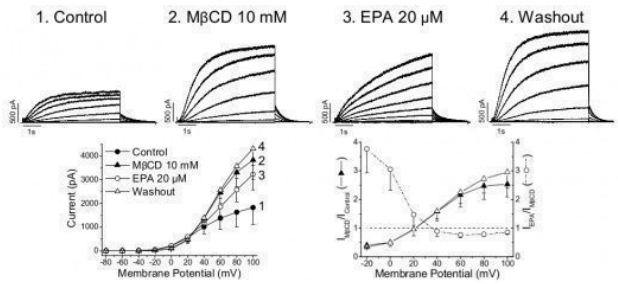
Lete...Alonso {Biophys J, 108: 863}

Histones cause aggregation and fusion of lipid vesicles containing phosphatidylinositol-4-phosphate. Lete MG, Sot J, Gil D, Valle M, Medina M, Goñi FM, Alonso A. Biophys J. 2015 Feb.; 108: 863.



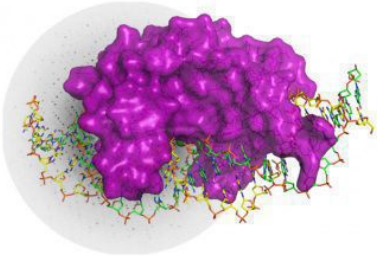
Risso...Sanchez-Ruiz {Mol Biol Evol, 32: 440}

Mutational Studies on Resurrected Ancestral Proteins Reveal Conservation of Site-Specific Amino Acid Preferences throughout Evolutionary History. Risso VA, Manssour-Triedo F, Delgado-Delgado A, Arco R, Barroso-del Jesus A, Ingles-Prieto A, Godoy-Ruiz R, Gavira JA, Gaucher EA, Ibarra-Molero B, Sanchez-Ruiz JM. Mol Biol Evol. 2015 Feb.; 32: 440.



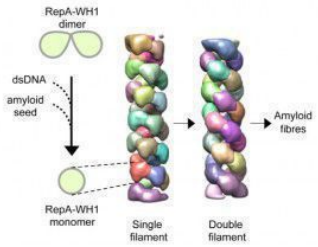
Moreno...Valenzuela {Cardiovasc Res 105: 223}

Marine n-3 PUFAs modulate IKs gating, channel expression, and location in membrane microdomains. Moreno C, de la Cruz A, Oliveras A, Kharche SR, Guizy M, Comes N, Starý T, Ronchi C, Rocchetti M, Baró I, Loussouarn G, Zaza A, Severi S, Felipe A, Valenzuela C. Cardiovasc Res. 2015 Feb.; 105: 223.



Molina...Montoya {Nat Struct Mol Biol 22: 65}

Visualizing phosphodiester-bond hydrolysis by an endonuclease. Molina R, Stella S, Redondo P, Gomez H, Marcaida MJ, Orozco M, Prieto J, Montoya G. Nat Struct Mol Biol. 2015 Jan; 22: 65.



Torreira...Llorca {Structure 23: 183}

Amyloidogenesis of Bacterial Prionoid RepA-WH1 Recapitulates Dimer to Monomer Transitions of RepA in DNA Replication Initiation. Torreira E, Moreno-Del Álamo M, Fuentes-Perez ME, Fernández C, Martín-Benito J, Moreno-Herrero F, Giraldo R, Llorca O. Structure 2015 Jan 6; 23: 183.

Biofísica Magazine

SBE PRIZES

Juan A. Hermoso {'Manuel Rico' – Bruker – SBE Prize, 2015}

The Executive Council of SBE has awarded the 2015 "Manuel Rico" – Bruker Prize to:

DR. JUAN A. HERMOSO

> *For his extensive CV, especially in recent years, and his important contributions in the field of Structural Biology.*

ABOUT THE *"MANUEL RICO"* – BRUKER PRIZE

> *Recognizes the excellence of work carried out in Spain in the field of Biophysics during the last 10 years.*

Sponsored by: Bruker Española S.A.

Addressed to: Biophysicist who develope their main activity in Spain. **Preference** is given to members of the SBE working on Structure/Function problems from a Biophisics perspective.

Award: 3000 € and a talk delivered by the awardee during a special session of the 15th SBE

Congress (Granada June 10 – 12, 2015).

More information: Please, visit the SBE website.

ABOUT THE 2015 AWARDEE

Dr. Juan A. Hermoso

Is Full Professor at the Department of Crystallography and Structural Biology – CBE of **"Instituto de Química-Física 'Rocasolano'", CSIC**, Madrid.

Scientific Trajectory

Masters Degree in Theoretical Physics, University of Salamanca, Spain (1988). Ph.D. in Physics, Complutense Univertity, Madrid, Spain (1992). Postdoct in the Laboratoire de Crystallographie CNRS, Grenoble, France (1993) and in the Institut de Biologie Structurale – IBS, Grenoble, France (1994-1995). Associate Scientist (1996-1998), Tenured Scientist (2005-2008) and Professor (2009 –) at CBE, CSIC. **Dr. Juan A. Hermoso** is author of more than 144 publications in international journals and co-author of 5 books.

Research interests

Mechanisms of virulence and pathogenesis and the means to circumvent them, using Structural Biology. With a focus on proteins of the bacterial surface related to disease *via* key functions like host-pathogen interactions, division, antibiotics resistance or the remodeling of the peptidoglycan framework.

More information

Please, visit the website of Dr. Juan A. Hermoso's group.

Biofísica Magazine

SBE PRIZES

Irene Díaz-Moreno {'Enrique Pérez Payá' – SBE40, 2015}

The Executive Council of SBE has awarded the 2015 *"Enrique Pérez Paya"* SBE40 Prize to:

DR. IRENE DÍAZ-MORENO

> *For her excellent work on the field of weak protein-protein and protein-RNA interactions.*

ABOUT THE *"ENRIQUE PÉREZ-PAYA"* – SBE40 PRIZE

> *Recognizes the trajectory of a Biophysicist with age under 40 with a special contribution to the progress of Biophysics in Span.*

Sponsored by: BCN Peptid and Prima – Derm.

Addressed to: Biophysicists under 40 who develope their main activity in Spain. **Preference** is given to members of the SBE and to achievements from the last 10 years.

Award: 1500 € and a talk delivered by the awardee during a special session of the 15th SBE Congress (Granada June 10 – 12, 2015)

More information: Please, visit the SBE website

ABOUT THE 2015 AWARDEE

Dr. Irene Díaz-Moreno

Is Associate Professor of Biochemistry and Molecular Biology at the Institute of Plant Biochemistry and Photosynthesis – IBVF of the **Scientific Research Centre Isla de la Cartuja – cicCartuja**, in Seville (Spain).

Scientific Trajectory

Ph.D. with European mention from the University of Seville, Spain (2005). **Dr. Irene Díaz-Moreno** has worked in collaboration with groups at the Universities of Göteborg (Sweden) and Leiden (The Netherlands), on molecular recognition between metalloproteins involved in electron-transfer processes. She was an EMBO postdoctoral fellow (2006 – 2008) at the NIMR-MRC in London (UK), working on the regulatory mechanisms of mRNA decay by RNA-binding proteins. In 2010, she won a permanent position at the University of Seville, where she is developing research projects on Biointeractomics field, as well as on the post-translational regulation of biological macromolecules.

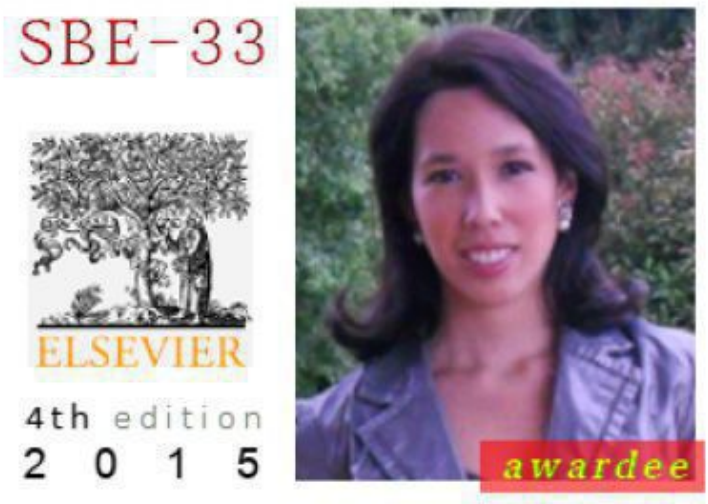
More information

Please, visit the website if the Biointeractions Group, at IBVF – cicCartuja, Seville.

Biofísica Magazine

AWARDS / SBE PRIZES

Cecilia Artola-Recolons {SBE33 Prize, 2015}



The Executive Council of SBE has awarded the 2015 SBE33 Prize to:

DR. CECILIA ARTOLA-RECOLONS

> *For her excellent work on the recycling of the bacterial cell wall and its implications for antibiotic resistance.*

ABOUT THE SBE33 PRIZE

> *Recognizes the work of outstanding young Biophysicists under 33, independently of the country where their work has been done.*

Sponsored by: Elsevier.

Award: 1000 € and a talk delivered by the awardee during a special session of the 15th SBE Congress (Granada June 10 – 12, 2015).

More information: Please, visit the SBE website

ABOUT THE 2015 AWARDEE

Dr. Cecilia Artola-Recolons

Did her Ph.D. with Prof. Dr. Juan A. Hermoso, at the Department of Crystallography and Structural Biology – CBE of **"Instituto de Química-Física 'Rocasolano'", CSIC**, Madrid, and in collaboration with Prof. Dr. Shahriar Mobashery from the University of Notre Dame (Indiana, USA). She has a B.S. in Chemistry, by the University of Oviedo (2009) and during 2008 worked as a research assistant with Dr. Jason Halfen (University of Wisconsin, USA).

Research interests

Dr. Artola-Recolon's work has focused on elucidating the relationship between cell wall recycling and antibiotic resistance, which has proved essential for the discovery of new antibiotic targets in bacteria. She has used mainly Structural Biology (X-ray crystallography) and bioinformatics techniques. Her structural work shows how bacterial lytic transglycosylase attaches to the membrane and reacts with cross-linked and non-cross-linked peptidoglycan chains. She has also contributed to deciphered the action mechanism of specific periplasmic amidases from the human patogen *Pseudomonas aeruginosa*, explaining their specificity for soluble or insoluble fractions of Peptidoglycan.

Biofísica Magazine

EVENTS / MEETINGS

15th SBE Congress

Annual Meeting of the Spanish Biophysical Society. **June 10 – 12, 2015**, Granada (Spain).

Presentation

Dra. Ana Isabel Azuaga-Fortes (in the name of the Organizing Committee), *University of Granada.*

On behalf of the Organising Committee, it is a great honour to invite you to the 15th Congress of the Spanish Biophysical Society in Granada, a world heritage city by UNESCO.

The congress will be held at the "Facultad de Ciencias", an excellent facility in the centre of the city, as a part of the University of Granada, which will allow for an easy access to all scientific sessions.

The University of Granada (UGR), founded in 1531, continues a long teaching tradition, the roots of which can be traced back to the madrasahs of the last Nasrid Kingdom. The University is a vibrant presence in the city of Granada, benefiting from the distinctive beauty of its environment and a privileged geographical location due to its proximity to the Sierra Nevada and

the Mediterranean coast.

The commitment to high-quality research has placed the UGR in a prominent position in terms of national rankings. The Postgraduate School offers 68 master's and 116 doctorate programmes. For many years, the UGR has promoted a significant international activity. It is the leading European university in terms of receiving students and the second Spanish university in terms of the mobility of its own students.

The congress will be structured in parallel symposiums/symposia with several plenary lectures, conducted by outstanding scientists in their areas. All participants will be able to attend the scientific program, which has been carefully designed to promote debating and enriching discussions, with especial "care" given to the poster sessions. The wide variety of areas within Biophysics to be discussed during the conference will provide the participants with an unique vision of the state-of-the-art at an international level in this attractive and highly developing field.

Any important news regarding to the organization as well as registration, accommodation, etc will be conveniently posted and periodically updated on the website of the Conference, as well as useful tourist/social information about the City of Granada, which may be of the participants´ interest.

We specially encourage young scientists to participate in the 15th Spanish Biophysical Congress, where they should expect not only an enriching scientific training during the Congress Sessions but also a wonderful personal experience in the city.

Bursaries

The Spanish Biophysical Society funds a limited number of grants, endowed with either 150 € (modality **A**) or 250 € (modality **B**) for young researchers (PhD students or Postdocs). Applicants must be members of SBE at the time of receiving the grant.

Awardees must attended the whole Meeting and present a communication. For more details and instructions to apply, please follow *this* link.

Deadlines

- Application for Bursaries: March 15th 2015. *Decision will be communicated by April 15th 2015*.
- Early Registration (low fee): May 8th 2015.
- Abstract Submission: May 15th 2015.

More information

Please, visit the Congress Web Site.

Biofísica Magazine

EVENTS / MEETINGS

10th European Biophysics Congress

10th European Biophysics Congress – EBSA 2015. **July 18 – 22, 2015**, Dresden (Germany).

Deadlines

- February 15, 2015. EBSA Bursary Application.
- March 15, 2015. End of abstract submission
- April 15, 2015. End of early bird registration
- July 8, 2015. End of online registration

Satellite Meetings

Before and after the EBSA 2015 conference, several satellite meetings will be held:

1. **Spectroscopies in biology.**
   July 15-18, 2015. Hotel Sportwelt Radeberg
   FREE workshop for eligible students
   Visit webpage for further information
2. **FOR1805 / Metacode Satellite Meeting. Genetic code and translation: from single molecule to systems biology view**

July 17-18, 2015. Internationales Congress Center Dresden
Visit webpage for further information

3. **3rd ARBRE Meeting.**
   July 17-18, 2015.
   Further information will be provided in due time
   Visit this site for further information
4. **Cell mechanics – From methods to applications.**
   July 18, 2015. Center for Regenerative Therapies Dresden
   Further information will be provided in due time
   Visit this site for further information
5. **Active matter.**
   July 18, 2015. Center for Regenerative Therapies Dresden
   Further information will be provided in due time
   Visit this site for further information

More information

Please, visit the Conference Web Site.

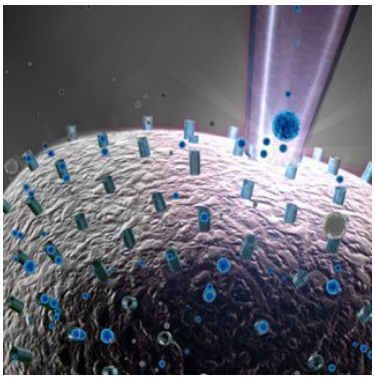
Biofísica Magazine

CATEGORY: MEETINGS

Meetings, Congresses and Simposia

15th SBE Congress

Annual Meeting of the Spanish Biophysical Society. June 10 – 12, 2015, Granada (Spain).



RECI V – 5th Spanish Ion Channel Network Meeting

RECI V | 5th Spanish Ion Channel Network Meeting. October 4 – 6, 2015, Barcelona (Spain).

IX Meeting of the Structure and Function of Proteins Network

IX Reunión Temática | Red de Estructura y Función de Proteínas. November 11 – 13, 2015, Sevilla, cicCartuja (Spain).

ISMAR 2015

ISMAR: International Society of Magnetic Resonance. August 16th – 21st, 2015, Shanghai, East China Normal University (China).

40th FEBS Congress

40th FEBS Congress: The Biochemical Basis of Life. July 4 – 9, 2015, Berlin (Germany).

NanoSpainConf: Bio&Med 2015

NanoSpainConf 2015 is part of ImagineNano 2015 Largest European Event in Nanoscience & Nanotechnology, Bilbao Exhibition Centre (BEC), Bilbao (Spain).

15th FEBS Young Scientists' Forum (YSF)

Satelite meeting of 40th FEBS Congress: 15th FEBS Young Scientists (YSF) Forum. July 2 – 4, 2015, Berlin (Germany).

NMR Symposium – in Memory of Manuel Rico

Scientific symposium to celebrate Prof. Manuel Rico's legacy April 10 th , 2015, Instituto de Química Física "Rocasolano", Madrid.

Biophysical Society Thematic Meetings 2015

Thematic Meetings organized by the Biophysical Society. 2015: Taipei, Madrid, Rio de Janeiro, Stellenbosch. Each year, the Biophysical Society sponsors small focused-topic meetings that are organized by Society members. The Society provides partial financial support...

10th European Biophysics Congress

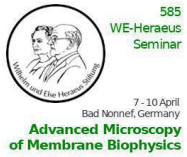
10th European Biophysics Congress – EBSA 2015. July 18 – 22, 2015, Dresden (Germany).

European Conference on Organised Films – ECOF14

14th European Conference on Organised Films. June 29-July 2, 2015, Genova (Italy).

Biomolecules and Nanostructures-5

5th edition of the conference on Biomolecules and Nanostructures. May 13-17, 2015, Jaroszowice near Krakow (Poland).



Advanced Microscopy of Membrane biophysics: 585 WE-Heraeus Seminar

585 WE – Heraeus Seminar: Advanced Microscopy of Membrane biophysics. April 7 -10, 2015, Physikzentrum, Bad Honnef (Germany).

29th Protein Society Meeting

29th Annual Meeting of the Protein Society. July 22 – 25, 2015, Fira de Barcelona – Montjuïc, Barcelona (Spain).

59th BPS Meeting

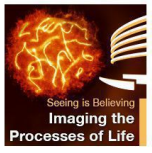
59th Biophysical Society Annual Meeting. February 7 – 11, 2015, Baltimore, Maryland (USA).

Biological Oscillators: Design, Mechanism, Function

EMBO | EMBL Symposium: Biological Oscillators: Design, Mechanism, Function. November 12 -14, 2015, EMBL Heidelberg (Germany).

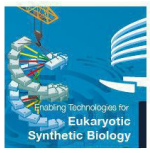
New Approaches and Concepts in Microbiology

EMBO | EMBL Symposium: New Approaches and Concepts in Microbiology. October 11 -14, 2015, EMBL Heidelberg (Germany).



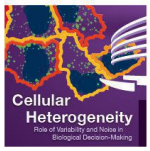
Seeing is Believing – Imaging the Processes of Life

EMBO | EMBL Symposium: Seeing is Believing – Imaging the Processes of Life. October 6 -10, 2015, EMBL Heidelberg (Germany).



Enabling Technologies for Eukaryotic Synthetic Biology

EMBO | EMBL Symposium: Enabling Technologies for Eukaryotic Synthetic Biology. June 21 -23, 2015, EMBL Heidelberg (Germany).



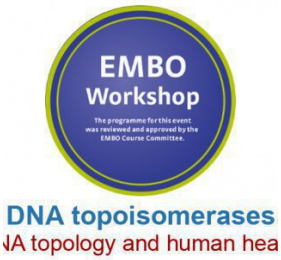
Role of Variability and Noise in Biological Decision-Making

EMBO | EMBL Symposium: Cellular Heterogeneity: Role of Variability and Noise in Biological Decision-Making. April 15 -18, 2015, EMBL Heidelberg (Germany).

Biofísica Magazine

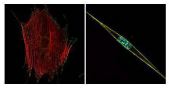
CATEGORY: WORKSHOPS

Workshops of the Interest to Biophysicists



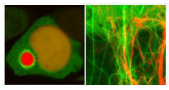
DNA topoisomerases, DNA topology and human health

EMBO | Workshop: DNA topoisomerases, DNA topology and human health. 13 – 17 September 2015, Les Diablerets (Switzerland).



Stem cell mechanobiology in development and disease

EMBO | Workshop: Stem cell mechanobiology in development and disease. 18 – 21 October 2015, Capri (Italy).



Macromolecular assemblies at the crossroads of cell stress and function

EMBO | Workshop: Macromolecular assemblies at the crossroads of cell stress and function. 31 May – 4 June 2015, Jerusalem (Israel).

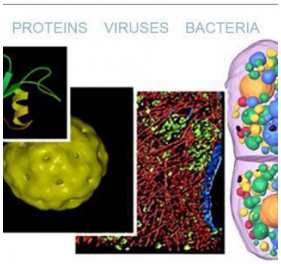
Enhancing Molecular Bioscience Education

Biochemical Society / FEBS Workshop: Enhancing Molecular Bioscience Education. March 30—31, 2015, Gonville & Caius College, Cambridge, (UK).

Biofísica Magazine

CATEGORY: COURSES

Lectured and Practical Courses



I2PC | INSTRUCT Course on Image Processing Applied to Structural of Biological Macromolecules

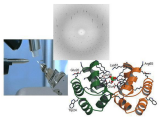
I2PC hands on course image processing applied to the structural characterization of biological macromolecules. June 29th – July 3rd, 2015, Spanish National Center for Biotechnology / Instruct Image Processing Center (I2PC), Madrid (Spain).

EMBO Laboratory Management Courses 2015

Leadership and management skills are critical for a successful career in science Practical exercises, in the form of role-play and discussion groups, provide hands-on experience. As much theory as necessary and as much practice as...

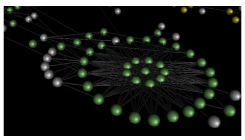
Structure, dynamics and function of biomacromolecules by NMR

EMBO | Practical Course: Structure, dynamics and function of biomacromolecules by NMR. July 31 – August 7 2015, Garching (Germany).



6th Macromolecular Crystallography School – MCS2015

MCS2015 6th Macromolecular Crystallography School. May 18th – 23rd 2015, CBE (Department of Crystallography and Structural Biology) of the Institute of Physical-Chemistry "Rocasolano", CSIC, Madrid (Spain).



Computational analysis of protein-protein interactions: From sequences to networks

EMBO | Practical Course: Computational analysis of protein-protein interactions: From sequences to networks. 28 September – 4 October 2015, Norwich (UK).

XI NMR Summer School at Jaca

Manuel Rico NMR School | XI NMR Summer School. March Sunday 21 June to Friday 26 June 2015, University Residence of Jaca, Huesca, (Spain).

V Course on Quantitative Proteomics

5th Course on Quantitative Proteomics. March 23–27, 2015, Centro Nacional de Biotecnologia (CNB), Consejo Superior de Investigaciones Cientificas (CSIC), Madrid, (Spain).

5th International School on Biological Crystallization – ISBC2015

ISBC Granada 2015 5th International School on Biological Crystallization. May 24–29, 2015, Granada, (Spain).

Synthetic Biology in Action

EMBO | Practical Course: Synthetic Biology in Action. 8 – 20 Jun 2015, EMBL Heidelberg (Germany).

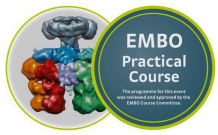


Image processing for cryo electron microscopy

EMBO | Practical Course: Image processing for cryo electron microscopy. 1 – 11 September 2015, London (United Kingdom).

Modern biophysical methods for protein-ligand interactions

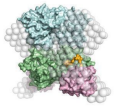
EMBO | Practical Course: Modern biophysical methods for protein-ligand interactions. 1 – 5 June 2015, Oulu (Finland).

The application of transient kinetic methods to biological macromolecules

EMBO | Practical Course: The application of transient kinetic methods to biological macromolecules. 21 – 27 June 2015, Kent (UK).

Small angle neutron and X-ray scattering from proteins in solution

EMBO | Practical Course: Small angle neutron and X-ray scattering from proteins in solution. 18 – 22 May 2015, Grenoble (France).



Structural and biophysical methods for biological macromolecules in solution

EMBO | Lecture Course: Structural and biophysical methods for biological macromolecules in solution. 4 – 10 May 2015, Taipei (Taiwan).

Summer School in Systems Medicine

FEBS ADVANCED LECTURE COURSE: Advanced Summer School in Systems Medicine: Implementation of Systems Medicine across Europe. June 22–26, 2015, Djurhamn, (Sweden).

Biomembranes: Molecular Architecture, Dynamics and Function

JOINT FEBS/EMBO LECTURE COURSE Biomembranes: Molecular Architecture, Dynamics and Function. June 15–25, 2015, Cargèse, (France).

Advanced Imaging of Molecular Complexes Inside Living Cells

FEBS PRACTICAL COURSE: Advanced Imaging of Molecular Complexes Inside Living Cells. June 8–12, 2015, Amsterdam, (Netherlands).

7th Practical Course in Systems Biology

FEBS PRACTICAL COURSE: 7th International Practical Course in Systems Biology. June 1–12, 2015, Göteborg, (Sweden).

Minischool on Biophysics of Protein Interactions

ICTP – SAIFR Minischool on Biophysics of Protein Interactions. March 9–13, 2015, Sao Paulo, (Brazil).

FEBS Advanced Courses

FEBS funds a range of scientific and educational events on advanced topics in Biochemistry, Molecular Biology and related disciplines, like Biophysics. The FEBS Advanced Courses Programme includes Lecture Courses, Workshops and Practical Courses, especially valuable...

Biofísica Magazine

CATEGORY: NEWS

GRANTS / NEWS 24 APR, 2015

‘Severo Ochoa’ and ‘María de Maeztu’ Excellence Awards

Winners of 2014 Call of ‘Severo Ochoa’ and ‘María de Maeztu’ Excellence Awards The “Severo Ochoa Centres of Excellence” and “María de Maeztu Units of Excellence” Support and Accreditation is a programme of the Secretary...

NEWS 1 APR, 2015

Horizon Magazine Special Issue – EU Funding 1984 – 2014

A Review of EU Research Framework Programmes, 1984 – 2014 Special Issue Funding research for three decades Since 1984, the Framework Programmes for research and innovation have been funding breakthroughs across Europe. Horizon looks at...

AWARDS / NEWS / NOMINATIONS 27 MAR, 2015

For Women in Science – 10th Edition 2015

L’Oreal For Women in Science – 10th Edition 2015 Deadline May 10th 2015. Founded in 1998, the L’Oréal-UNESCO For Women in Science partnership was created to recognize and promote women in science. Its programs reward...

GRANTS / NEWS 16 MAR, 2015

Teresa Giraldez Winner of an ERC Consolidator Grant

Teresa Giráldez, from the Medical School and Center for Biomedical Research of the Canary Islands – CIBICAN, La Laguna University, SBE member and awardee of 2011 edition of the SBE-40 Prize, has won a 2014...

GRANTS / NEWS 16 MAR, 2015

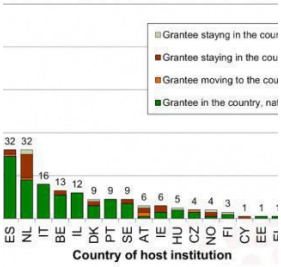
Aitziber López-Cortajarena Gets an ERC Consolidator Grant

SBE member Aitziber López-Cortajarena, from the "Instituto IMDEA Nanociencia", Madrid (Spain) has won a 2014 ERC Consolidator Grant. Dr. López-Cortajarena is among the 33 Spanish Scientists awarded in the latest ERC Consolidator Grant competition (2014...

GRANTS / NEWS 16 MAR, 2015

Xavier Salvatella: ERC Consolidator Grantee

Xavier Salvatella, from the Institute for Research in Biomedicine, Barcellona (Spain), SBE member and awardee of 2013 edition of the SBE-40 Prize, has won a 2014 ERC Consolidator Grant. The results of the latest ERC...



CALLS / GRANTS / NEWS 12 MAR, 2015

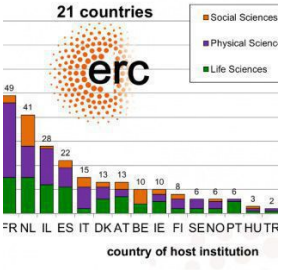
ERC Consolidator Grants: Results from 2014 call

372 Projects Funded, 32 in Spain Among the winners are three SBE members: Teresa Giráldez, from the Medical School and Center for Biomedical Research of the Canary Islands (CIBICAN), La Laguna University (Tenerife) Aitziber López-Cortajarena,...

AWARDS / NEWS / SBE PRIZES 9 MAR, 2015

Announcement of the 2015 SBE awards

After due deliberations, the Executive Council of SBE announces the 2015 SBE Awards “Manuel Rico” – Bruker Prize Awarded to: Dr. Juan A. Hermoso For his extensive CV, especially in recent years, and his important...



CALLS / GRANTS / NEWS 3 MAR, 2015

ERC Starting Grants 2014 – Full results – Update

Final results: 375 PI Grated, 22 will work in Spain In addition to 328 early-career scientists awarded ERC Starting Grants in December, the European Research Council today announces another 47 winners as part of this...

CALLS / JOBS / NEWS / POSTDOC 3 MAR, 2015

Contratos Torres Quevedo 2014

Programa Estatal de Promoción del Talento y su Empleabilidad en I+D+i Subprograma Estatal de Incorporación Ayudas de una duración de tres años a empresas, centros tecnológicos de ámbito estatal, centros de apoyo a la innovación...

AWARDS / NEWS / NOMINATIONS 2 MAR, 2015

SEBBM Research Prizes 2015

The “Sociedad Española de bioquímica y Biología Molecular” – SEBBM calls for candidates to three types of Research Prizes For scientists in the field of Biochemistry and Molecular Biology, including Biophisicists! In all cases the...

NEWS 26 FEB, 2015

Félix Goñi Named Member of RANF

Former President (1993-1998) and Honorary Fellow (2011) of SBE, Dr. Félix M. Goñi Urcelay, took today (February 26th 2015) office as a new member of the Spanish Royal National Academy of Pharmacy – RANF, in...

CALLS / GRANTS / NEWS 16 FEB, 2015

PRACE Call Announcement 2105

PRACE, the Partnership for Advanced Computing in Europe PRACE provides HPC resources to researchers and scientists through Preparatory Access (code scaling and optimization) and/or through Project Access (large-scale, computationally intensive projects). Deadlines / Call Types...

CALLS / JOBS / NEWS / POSTDOC 16 FEB, 2015

Ikerbasque Research Positions 2015

15 Contract Positions for postdoctoral researchers, within any of the Basque Research Institutions 5 years contract in Universities, BERC – Basque Excellence Research Centres, CIC – Cooperative Research Centres, Biomedical institutions and Technology Corporations, among...

GRANTS / NEWS 13 FEB, 2015

SBE member Fernando Moreno-Herrero gets an ERC “Proof of Concept” Grant

Fernando Moreno-Herero (National Center of Biotechnology, CNB, CSIC, Madrid), SBE member and awardee of 2014 edition of “Enrique Pérez-Payá” Prize, wins a 2014 ERC “Proof of Concept” Grant ERC ‘Proof of Concept’ grants are conceived...

AWARDS / NEWS / NOMINATIONS 13 FEB, 2015

Xavier Solans Prize – 2015

4th Edition of "Xavier Solans" Prize Deadline February 28th 2015. In memory of the Spanish crystallographer Xavier Solans, this prize will recognize the best scientific work published in 2014 in the field of Crystallography and...

MEETINGS / NEWS 11 FEB, 2015

NMR Symposium – in Memory of Manuel Rico

Scientific symposium to celebrate Prof. Manuel Rico's legacy April 10 th , 2015, Instituto de Química Física "Rocasolano", Madrid, (Spain)., Deadlines Please confirm your assistance before 23rd March 2015 at lvega@iqfr.csic.es. Program 10:30 Welcome: Prof....

CALLS / GRANTS / NEWS 11 FEB, 2015

ERC Consolidator Grant – 2015 Call

ERC-2015-CoG Deadline: 12nd March 2015 17:00:00 (Brussels local time) for registration and electronic proposal submission Latest information for applicants. ERC Consolidator Grants are designed to support excellent Principal Investigators at the career stage at which...

CALLS / GRANTS / NEWS 9 FEB, 2015

14 ERC "Proof of Concept" Projects go to Spain

Spain gets 14 Proof of Concept ERC Grants Worth up to €150,000 per grant, 'Proof of Concept' funding helps ERC grant holders to bridge the gap between their existing frontier research and its commercial applications....

AWARDS / NEWS / NOMINATIONS 5 FEB, 2015

Princess of Asturias Awards, 2015

Call for Nominations in Technical and Scientific Research Deadline 12th March 2015. The Princess of Asturias Awards are intended to reward scientific, technical, cultural, social and humanitarian work carried out at an international level by...

FELLOWSHIPS / NEWS / PREDOC 30 JAN, 2015

International PhD "la Caixa" – Severo Ochoa 2015

International PhD program Severo Ochoa sponsored by "Obra Social la Caixa" Four years grants 2 – 3 grants for candidates of any nationality assigned to each of 18 research centres from Spain awarded a Severo...

AWARDS / NEWS / NOMINATIONS 28 JAN, 2015

Rey Jaime I Awards, 2015

Deadline March 22nd 2015. The Rey Jaime I Prizes were created in 1989 through the initiative of the Valencian Foundation for Advanced Studies. His Majesty the King is the Honorary President. Their objectives were to...

CALLS / GRANTS / NEWS 26 JAN, 2015

Retos-Colaboración 2015

Programa Estatal de I+D+i Orientada a los Retos de la Sociedad La convocatoria RETOS-COLABORACIÓN pretende estimular a través de la financiación de proyectos, la generación de una masa crítica en I+D+I de carácter interdisciplinar necesaria...

GRANTS / NEWS 21 JAN, 2015

El programa Ramón y Cajal incorpora 175

investigadores al sistema de I+D+i

El programa Ramón y Cajal incorpora 175 investigadores al sistema de I+D+I La Secretaría de Estado de Investigación, Desarrollo e Innovación ha publicado la lista con los 175 candidatos seleccionados por el programa Ramón y...

GRANTS / NEWS 21 JAN, 2015

España obtiene 20 ayudas del Consejo Europeo de Investigación

España obtiene 20 ayudas del Consejo Europeo de Investigación See a recent update of these news El Consejo Europeo de Investigación (ERC, en sus siglas en inglés) ha publicado los resultados de la primera convocatoria...

NEWS 21 JAN, 2015

IUPAB NEWS, Nº 62

Published IUPAB News Nº 62, December 2014 Editor Louise Matheson. Activities of the INTERNATIONAL UNION for PURE and APPLIED BIOPHYSICS. From the Secretary – General: Professor C.G. dos Remedios, Bosch Institute. Get Full Document Follow...

AWARDS / NEWS 16 JAN, 2015

Premios Nacionales de Investigación 2015

SS.MM. los Reyes y el ministro de Economía entregan los Premios Nacionales de Investigación Premio Nacional de Investigación “Gregorio Marañón”, en el área de Medicina Jesús María Prieto Valtueña catedrático de Medicina de la Universidad...

AWARDS / NEWS / NOMINATIONS / SBE PRIZES 13 JAN, 2015

SBE – 33, 2015

Deadline January 23rd 2015. Recognizes a young Biophysicist with age under 33, who have contributed significantly to the developmen of Biophysics, in Spain and/or abroad. Sponsored by Elsevier. Addressed to Outstanding young Biophysicists under 33,...

AWARDS / NEWS / NOMINATIONS / SBE PRIZES 13 JAN, 2015

'Enrique Perez Paya' – SBE40 , 2015

Deadline January 23rd 2015. Recognizes the trajectory of a Biophysicist with age under 40 with a special contribution to the progress of Biophysics in Span. Sponsored by BCN Peptid and Prima – Derm. Addressed to...

AWARDS / NEWS / NOMINATIONS / SBE PRIZES 13 JAN, 2015

Bruker – SBE Prize, 2015

Deadline January 23rd 2015. Recognizes the excellence of work carried out in Spain in the field of Biophysics during the last 10 years. Sponsored by Bruker Española S.A.. Addressed to Biophysicist who develope their main...

AWARDS / EBSA PRIZES / NEWS / NOMINATIONS 12 JAN, 2015

Avanti Polar Lipids / EBSA Award

Deadline December 31st 2014. For outstanding contributions to our understanding of lipid biophysics. Addressed to The nominee will be expected to have made important and well-recognized contributions to an understanding of lipid biophysics. The nominee...

AWARDS / EBSA PRIZES / NEWS / NOMINATIONS 12 JAN, 2015

EBSA Young Investigators' Medal and Prize

Deadline December 31st 2014. The prize will be given to a promising young scientist. It will be awarded at the 10th Biophysics Congress, in Dresden in 2015. Addressed to The candidate should normally be within...

Biofísica Magazine

NEWS

EditorSelect

A selection of News from External Sources

Brought to you by the Editors. They are picked up from **RSS-feeds** of Science Daily, EurekAlert, Nature, Science, Biophysical Journal and the BPS Blog. Here is just the *head end* of our news lists. To see all selected news please visit the online version of EditorSlect.

To access the complete original text of particular News, please *follow its associated link*.

BIOPHYSICS RELATED NEWS

- [Self-assembly] Bacteria swim to form crystals: 29/04/15
- [Emerging Techniques] "Inertial imaging": Simultaneous detection of mass and shape of single molecules: 27/04/15
- [Protein Folding] Ribosomes help careful protein folding: 24/04/15
- [Imaging] Multiplexed RNA imaging in single cells: 24/04/15
- [Simulations] Quantum model reveals surface structure of water: 20/04/15
- [Structural Biology] Resolving whole mitoribosomes: 17/04/15
- [Cell Biophysics] Stem cells can sort mitochondria by age: 17/04/15
- [Protein Structure] Engineering superenzyme function: 17/04/15
- [Cell Biophysics] Chameleons change colour by tuning nanoscopic structures in their skin cells: 18/03/15
- [Nanotech-DNA] Spherical nucleic acids

GENERAL SCIENCE NEWS

- [Ethical Issues] *Debate*:
  - Chinese scientists genetically modify human embryos: 22/04/15.
  - Scientists sound alarm over DNA editing of human embryos: 12/02/15.
  - Don't edit the human germ line : 12/02/15.
- [Exobiology] Mars might have salty liquid water: 13/04/15.
- [Postdoc Crisis] *Debate*:
  - Wanted: staff-scientist positions for postdocs: 10/04/15.
  - The future of the postdoc: 07/04/15.
- [Future of Science] Online debate erupts to ask: is science broken?: 20/03/15.
- [Brain Prize] World's most valuable brain research prize goes to inventors of revolutionary microscope: 09/03/15.
- [Lindau-2015] *65th Nobel Laureate Meeting*. 70 Nobel laureates and 672

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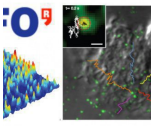

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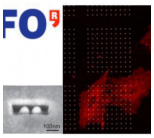

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Funded by "la Caixa" – Severo Ochoa Programme description from CNIC website: In the context of the CNIC International PhD...

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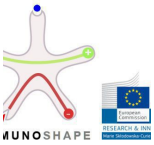

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ITN Fellowships Call: IMMUNOSHAPE Marie Skłodowska-Curie Innovative Training Network (ITN-ETN) Duration: January 1st 2015 – December 31st 2018 IMMUNOSHAPE, is...

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Biomolecular NMR Facility Manager: UCL

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Two Research Associate Positions at King's College London

Two Research Associate positions open at the Experimental Biophysics & Nanotechnology Group (Dr Sergi Garcia-Mañes), Department of Physics, King's College...

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Postdoc | JdC – Training at IIBM, Madrid

Available position / support to apply to “Juan de la Cierva-Formación” (JdC-Training) fellowship, Laboratorio de Canales Iónicos del Instituto de...

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Postdoc | JdC at Biomembranes, Murcia

Available position / support to apply to “Juan de la Cierva” (JdC) fellowship “Biomembranes group, University of Murcia (Dr. Senena...

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PhD | FPU at Universidad de Murcia

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PhD | FPU at IBMC UMH, Elche

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PhD | FPU at cicCartuja, Sevilla

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PhD | FPU at IBMB, Barcelona

Opportunity / Support to apply to a FPU fellowship Proteolysis Lab, Molecular Biology Institute of Barcelona (IBMB), CSIC (Dr. Xavier...

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Molecular Computation Scientist

Urge la contratación de un químico/biólogo/físico computacional para participar en un proyecto colaborativo entre la Universidad de Santiago y la...

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