

GENERAL PROGRAM

PASSION FOR KNOWLEDGE

Quantum13

30 SEPTEMBER - 6 OCTOBER 2013  
BASQUE COUNTRY

[www.Quantum13.eu](http://www.Quantum13.eu)

 #quantum13



**INFORMATION:**

[www. Quantum13 .eu](http://www.Quantum13.eu)



PASSION FOR  
KNOWLEDGE

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# RED CARPET FOR SCIENCE

Welcome to **Passion for Knowledge**, a festival to promote science as a key activity for the wellbeing of future generations, as well as to highlight the thirst of knowledge as the driving force behind scientific, technological and cultural progress.

**Passion for Knowledge** is a scientific communication event that seeks to gather together scientists and the general public to talk about the **importance of science** in our daily lives.

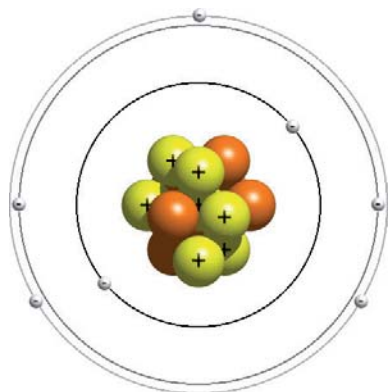
The event has been designed, promoted and organized by the **Donostia International Physics Center (DIPC)** within the framework of **Euskampus**, the Campus of International Excellence of the **University of the Basque Country (UPV/EHU)**. It will be held in Donostia-San Sebastian, Bilbao, Vitoria-Gasteiz and Pamplona, bringing the passion for science to the whole country and turn it into an extraordinary and unique science festival.

Under an innovative and creative approach, it offers a wide range of activities to create a meeting point between science and the general public, by involving them in the scientific culture and demonstrating the importance of research in society.

The title of the festival **Passion for Knowledge** reflects the work spirit of DIPC and its vocation in the service of society through the transmission of the knowledge generated in their research, and efforts to communicate their activities. It reflects the center's vocation and passion for scientific research and for spreading the scientific knowledge to society.

This is the second edition of **Passion for Knowledge**. The first one held in 2010, brought world leading scientists and humanists from other fields, together from different disciplines, cultures and thinking to celebrate the tenth anniversary of the DIPC underpinned by the commitment to the progress of science driven by a love of knowledge for its own sake.

# Why Quantum 13?



**Passion for Knowledge - Quantum 13** festival celebrates the **100th anniversary of the birth of Bohr's atomic model**, one of the fundamental milestones in the development of quantum mechanics.

In 1913 the Danish physicist Niels Bohr proposed a new atomic model for describing the nature and properties of atoms through three tenets: electrons describe circular orbits around the nucleus of the atom without radiating energy, electrons can be found only in specific orbits, and electrons emit or absorb energy only in jumps from one orbit to another.

The most novel thing about Bohr's atomic model was that it postulated the quantization or discretization of atomic states, which served as the springboard for the subsequent development of what is today known as Quantum Mechanics.

Few theories in physics aroused as much curiosity and interest as quantum mechanics, and probably no one else has had such a great impact on our lives in such a short time. Indeed, apart from having transformed our understanding of nature and the Universe, quantum mechanics has led to numerous technological applications that surround us in our daily lives: from electronics, where the electron quantum properties offer the possibility of transmitting and processing information, to medicine, where in many cases, thanks to quantum mechanics we have more accurate and less invasive diagnosis techniques. It is difficult to find fields in which quantum mechanics has not made a significant impact on our quality of life.



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All public lectures of **Passion for Knowledge - Quantum 13** will be offered by streaming and will be available at:  
**[www.quantum13.eu](http://www.quantum13.eu)** and **<http://dipc.tv>**

Follow us on social networks:    

# Program of the festival


## Passion for Knowledge - Quantum 13

[www.Quantum13.eu](http://www.Quantum13.eu)


The **program** of polyhedral nature is similar to previous events organized by the DIPC and will include diverse activities that combine different proposals for participation, from debates to theater, segmenting the target audience, and exploring different media formats. **Passion for Knowledge - Quantum 13**, presents a conference for scientists, workshops focused on young researchers, encounters for our high school students, and of course activities for the general public.



OPEN TO THE PUBLIC  
LECTURES



STUDENTS of 4th HIGH  
SCHOOL  
ENCOUNTERS








SCIENTIFIC COMMUNITY  
BRANDT  
RITCHIE  
WORKSHOP



YOUNG RESEARCHERS  
WORKSHOPS





Monday 30 SEPT.	Tuesday 1 OCT.	Wednesday 2 OCT.	Thursday 3 OCT.	Friday 4 OCT.	Sunday 6 OCT.
<p>SCIENTIFIC COMMUNITY BRANDT RITCHIE WORKSHOP</p> 	<p>9:00 - 13:30 DIPC, Donostia <b>BRW Scientific Workshop</b></p>	<p>9:00 - 13:30 DIPC, Donostia <b>BRW Scientific Workshop</b></p>	<p>9:00 - 13:30 DIPC, Donostia <b>BRW Scientific Workshop</b></p>	<p>9:00 - 13:30 DIPC, Donostia <b>BRW Scientific Workshop</b></p>	
<p>YOUNG RESEARCHERS WORKSHOPS</p> 	<p>11:00 - 13:30 nanoGUNE, Donostia <b>Nobel Pitch</b></p>	<p>9:00 - 13:30 Tecnalia, Donostia <b>Training Workshop III Valorization</b></p>	<p>9:00 - 13:30 CFM, Donostia <b>Training Workshop I Presentation</b></p>	<p>9:00 - 13:30 CFM, Donostia <b>Training Workshop II Popularization</b></p>	
		<p>9:00 - 13:30 Bizkaia Aretoa, Bilbao <b>Training Workshop I Presentation</b></p>	<p>9:00 - 13:30 Bizkaia Aretoa, Bilbao <b>Training Workshop II Popularization</b></p>	<p>9:00 - 13:30 Tecnalia, Bilbao <b>Training Workshop III Valorization</b></p>	
<p>10:00 - 13:30 Eureka!, Donostia <b>Encounters</b></p>		<p>10:00 - 13:30 Artium, Vitoria-Gasteiz <b>Encounters</b></p>	<p>10:00 - 13:30 Bizkaia Aretoa, Bilbao <b>Encounters</b></p>		<p>STUDENTS of 4th HIGH SCHOOL <b>ENCOUNTERS</b></p> 
<p>18:00 - 20:00 Victoria Eugenia, Donostia <b>Keynote Lectures</b></p>	<p>17:00 - 19:15 Victoria Eugenia, Donostia <b>Keynote Lectures</b></p>	<p>17:00 - 19:15 Victoria Eugenia, Donostia <b>Keynote Lectures</b></p>	<p>17:00 - 19:15 Victoria Eugenia, Donostia <b>Keynote Lectures</b></p>	<p>17:00 - 19:15 Victoria Eugenia, Donostia <b>Keynote Lectures</b></p>	<p>OPEN TO THE PUBLIC <b>LECTURES</b></p>
	<p>19:00 - 20:00 Bizkaia Aretoa, Bilbao <b>Keynote Lectures</b></p>	<p>19:00 - 20:00 Bizkaia Aretoa, Bilbao <b>Keynote Lectures</b></p>			
	<p>19:30 - 20:30 Victoria Eugenia, Donostia <b>Naukas Quantum</b></p>	<p>19:30 - 20:30 Victoria Eugenia, Donostia <b>Naukas Quantum</b></p>	<p>19:30 - 20:30 Victoria Eugenia, Donostia <b>Naukas Quantum</b></p>		
			<p>OPEN TO THE PUBLIC <b>LECTURES</b></p>	<p>20:30 - 22:00 Victoria Eugenia, Donostia <b>Theater Play "The Interview"</b></p>	<p>20:00 - 21:30 Campos Eliseos, Bilbao <b>Theater Play "The Interview"</b></p>
		<p>Wednesday 9 OCT.</p>		<p>Friday 11 OCT.</p>	<p>Sunday 13 OCT.</p>
		<p>19:30 - 20:00 Planetario Pamplona <b>Lecture "The Bomb and the Swastika"</b></p>		<p>20:30 - 22:00 Felix Petite, Vitoria-Gasteiz <b>Theater Play "The Interview"</b></p>	<p>20:00 - 21:30 Auditorio Barañain, Pamplona <b>Theater Play "The Interview"</b></p>



# Public Program

PASSION FOR KNOWLEDGE

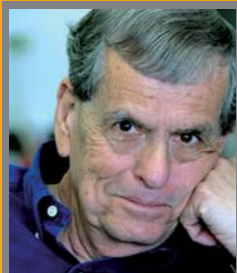
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Following the spirit of the previous **Passion for Knowledge** festival, the highlight is a series of **Lectures** open to the general public, offered by prestigious scientists and distinguished figures from different disciplines, cultures and thinking. However, the festival offers much more to the public; there is also a **Naukas Quantum** session in collaboration with the popular online science communication platform Naukas, **Video Exhibitions** in different places throughout the country, and even the première of a **Theater Play** that explores modern-day subjects, such as the importance and accountability of scientific research, and its relationship with society.

We are pleased to announce the following invited speakers:



**Dame Jocelyn BELL BURNELL**  
Fellow of the Royal Society and Professor of the University of Oxford



**Aaron CIECHANOVER**  
Nobel Prize in Chemistry 2004



**Juan Ignacio CIRAC**  
The Prince of Asturias Award in 2006 and Director of the Max Planck Institute of Quantum Optics in Garching



**Claude COHEN-TANNOUDJI**  
Nobel Prize in Physics 1997



**Ginés MORATA**  
Prince of Asturias Award for Scientific and Technical Research in 2007



**Sir John PENDRY**  
Dirac Prize 1996 and Fellow of the Royal Society



**José María PITARKE**  
Director of CIC nanoGUNE and Professor of UPV/EHU





Public Program

# Keynote Lectures

PASSION FOR KNOWLEDGE

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The Lectures of **Passion for Knowledge - Quantum 13** aim to bring the fascinating world of quantum mechanics and its implications in many fields to the public, as well as to foster the passion for knowledge in other subjects, such as biomedicine, astrophysics, neurology, literature... Several Nobel laureates and world-leading experts will offer lectures, combining scientific rigour and entertainment to awaken curiosity, interest, enthusiasm and critical thinking of society.

Aimed at: Everybody

Language: English, Spanish or Basque, with simultaneous translation into three languages.

**Donostia  
Victoria Eugenia Theater**

Capacity: 800 people

Dates: 30 SEP - 4 OCT

Time: 17:00 - 19:15

**Bilbao  
Bizkaia Aretoa**

Capacity: 400 people

Dates: 1 - 2 OCT

Time: 19:00 - 20:00

Registration: Registration is free

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**Dudley  
HERSCHBACH**  
Nobel Prize in  
Chemistry 1986



**Jean-Marie  
LEHN**  
Nobel Prize in  
Chemistry 1987



**Amand  
LUCAS**  
Fellow of the Académie  
Royale des Sciences,  
des Lettres et des  
Beaux-Arts de Belgique



**Lisa  
RANDALL**  
Professor of Harvard  
University and Member  
of the National Academy  
of Sciences of America



**Arantxa  
URRETABIZKAIA**  
Member of the  
Basque Language  
Academy  
-Euskaltzaindia



**Rafael  
YUSTE**  
Leader of the Brain  
Activity Map Project  
and Professor of  
Columbia University



Public Program

**Keynote Lectures**



Public Program

# Keynote Lectures

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Monday 30, SEPT.



**Victoria Eugenia**  
Donostia-San Sebastian

18:00 **Opening**

**Iñigo URKULLU**

President of the Basque Government

**Iñaki GOIRIZELAIA**

Rector of the University of the Basque Country

**Pedro Miguel ETXENIKE**

UPV/EHU Professor and President of the DIPC

18:30

**Dudley HERSCHBACH** Physics-Chemistry

**Homage to Niels Bohr: Prophet for Paradox**

en

19:15

**Juan Ignacio CIRAC** Theoretical Physics

**The supercomputers of the future**

**What will supercomputers be like in 50 years' time?**

es

Lecture language:

Euskera **eu**

Castellano **es**

English **en**

**BRW**

BRANDT  
RITCHIE  
WORKSHOP

DIPC  
Donostia



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**top@dipc**

*Zientziarekin solasean!*

**Encounters  
with Students**

Donostia  
Vitoria-Gasteiz  
Bilbao



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Public Program

# Keynote Lectures

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## Tuesday, 1 OCT.

**V** Victoria Eugenia  
Donostia-San Sebastian

17:00 **Lisa RANDALL** Theoretical Physics **en**  
**Double disk dark matter**

17:45 **Aaron CIECHANOVER** Biomedicine **en**  
**The Personalized Medicine Revolution:  
Are We Going to Cure all Diseases and at what Price?**

18:30 **Rafael YUSTE** Neurobiology **es**  
**The Brain Activity Map: Imaging the Activity of Entire Neural  
Circuits**

 19:30 **Naukas Quantum** More info page 14

**B** Bizkaia Aretoa  
Bilbao

19:00 **Dame Jocelyn BELL BURNELL** Astrophysics **en**  
**Black Holes in Space**

## Wednesday, 2 OCT.

**V** Victoria Eugenia  
Donostia-San Sebastian

17:00 **Claude COHEN-TANNOUJJI** Physics **en**  
**Atoms and Photons: From Optical Pumping to Ultracold Atoms**

17:45 **Jose Maria PITARKE** Physics **eu**  
**Graphene**

18:30 **Dame Jocelyn BELL BURNELL** Astrophysics **en**  
**Black Holes in Space**

 19:30 **Naukas Quantum** More info page 14

**B** Bizkaia Aretoa  
Bilbao

19:00 **Rafael YUSTE** Neurobiology **es**  
**The Brain Activity Map: Imaging the Activity of Entire Neural  
Circuits**



Public Program

# Keynote Lectures

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Thursday, 3 OCT.



**Victoria Eugenia**  
Donostia-San Sebastian

- 
- 17:00 **Sir John PENDRY** Photonics en  
**The Science of Invisibility**
- 
- 17:45 **Arantxa URRETABIZKAIA** Literature eu  
**We must be doing something right in relation to the Basque language**
- 
- 18:30 **Jean-Marie LEHN** Supramolecular Chemistry en  
**Towards Complex Matter: Chemistry? Chemistry!**
- 



19:30  
**Naukas Quantum** More info page 14

Friday, 4 OCT.



**Victoria Eugenia**  
Donostia-San Sebastian

- 
- 17:00 **Amand LUCAS** Physics en  
**Niels Bohr, X-Rays and the Secret of Life**
- 
- 17:45 **Ginés MORATA** Genetic es  
**Biology at the XXI Century**
- 
- 18:30 Closure
- 

**Nobel Pitch**  
Donostia

**Training  
Workshops**  
Donostia  
Bilbao

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**Theater Play**  
**The Interview**

Donostia  
Bilbao  
Vitoria-Gasteiz  
Pamplona

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Public Program

# Naukas Quantum

Divulgation in 10-minutes



The public program also includes a session called **Naukas Quantum**, organized in collaboration with the popular science communication platform on the internet **Naukas** and coordinated by the Chair of Scientific Culture of the UPV/EHU.

Just after the plenary talks, the best collaborators of Naukas platform will take to the stage of Victoria Eugenia Theater to offer the public their special view of the fascinating quantum world and other topics... The format follows that of successful science communication events organized by the platform in Bilbao: that is, communicate science in **10' short talks**, in lay words, and in a dynamic, amusing and original way.

Aimed at: Everybody  
 Capacity: 800 people  
 Language: Spanish (simultaneous interpretation into Basque and English)  
 Dates: 1 - 3 OCT  
 Time: 19:30 - 20:30  
 Venue: Donostia Victoria Eugenia Theater  
 Registration: Registration is free

[www.Quantum13.eu](http://www.Quantum13.eu)

	Tuesday <b>1</b> OCT.	Wednesday <b>2</b> OCT.	Thursday <b>3</b> OCT.
19:30 - 20:30	<b>Naukas Quantum</b>	<b>Naukas Quantum</b>	<b>Naukas Quantum</b>
19:30	The Bohr effect Juan Ignacio PÉREZ	Stanley Kubrik's black monolith Antonio J. OSUNA MASCARÓ	Bohr wasn't the first César TOMÉ
19:40	Quantum fantasy or the superposition of lunacy Mauricio-José SCHWARZ	Killing Schrödinger's cats Fernando FRÍAS	About how science helped win a war Julián ESTEVEZ
19:50	The principle of meteorological uncertainty José Miguel VIÑAS	The commercial quantum computer con Francis VILLATORO	The end of eternity, one hundred quantum years Javier ARMENTIA
20:00	S=ex2, sex is relative too Pere ESTUPINYÁ	Harald Bohr: an almost periodic football player Clara GRIMA	The extraordinary case of Saturn's polar hexagon Ricardo HUESO
20:10	A Super world Laura MORRÓN	How to have an aura your friends would kill for José Antonio PÉREZ	Real superheroes and mutants Lucas SÁNCHEZ
20:20	How to fall into a black hole and come out scorched Mario HERRERO-VALEA	Henrietta Leavitt, because I'm worth it Natalia RUIZ	The alternate history of a century without quantum mechanics Miguel SANTANDER



Public Program

# Theater Play: **La entrevista**

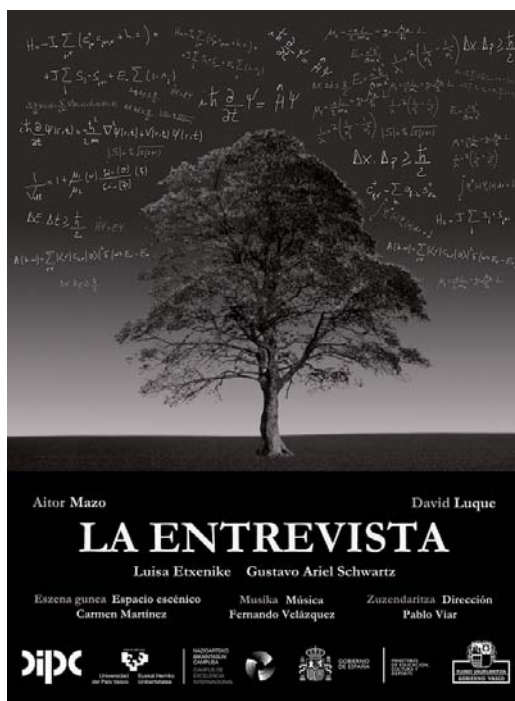
Staged as a meeting between a prestigious scientist at the height of his career and a challenging scientific journalist **"The Interview"** builds up to a passionate debate about modern-day subjects such as the value and accountability of scientific research and its relation to society and public life. As the plot thickens, the two protagonists cannot avoid revealing a second thread to the story in which both their characters acquire new traits and the relationship between them becomes surprisingly complex. The relationship which is gradually unravelled in **"The Interview"** and which is based upon personal and moral aspirations and conflicts, clearly conjures up the one between two of the most relevant scientists of the 20th century: the Danish, Niels Bohr and the German, Werner Heisenberg – a relationship which ended abruptly after their famous conversation in Copenhagen in 1941.

**"The Interview"** was scripted by the writer **Luisa Etxenike** and the physicist and writer **Gustavo Ariel Schwartz** and is part of the "Mestizajes" program of the Donostia International Physics Center.

The artistic director of **"The Interview"** is **Pablo Viar** and the cast of the play includes the actors **Aitor Mazo** and **David Luque**.

The play's première will be on **Friday, October 4** at the Victoria Eugenia Theater of Donostia - San Sebastian. Performances are also scheduled in **Bilbao, Vitoria-Gasteiz** and **Pamplona**.

Tickets for the performances are on sale in the Internet and in the usual sales points.



Friday <b>4</b> OCT.	Sunday <b>6</b> OCT.	Friday <b>11</b> OCT.	Sunday <b>13</b> OCT.
<b>GIPUZKOA</b>	<b>BIZKAIA</b>	<b>ARABA</b>	<b>NAFARROA</b>
20:30 Victoria Eugenia Theater Donostia	20:00 Campos Eliseos Theater Bilbao	20:30 Félix Petite Theater Vitoria-Gasteiz	20:00 Barañain Auditorium Pamplona
Tickets: ticket.kutxabank.es	Tickets: www.arteriaentradas.com  www.ticketmaster.es	Tickets: www.ticketea.com /la-entrevista	Tickets: www.auditoriobarain.com



Public Program  
**On Zientzia**

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SHOW YOUR **PASSION**  
FOR SCIENCE AND  
TECHNOLOGY AND  
SUBMIT YOUR **VIDEO!**

[www.onzientzia.tv](http://www.onzientzia.tv)



**ON ZIENTZIA** is a project devoted to audiovisual content creation involving the participation of the citizens, and organized by DIPC and Elhuyar. It's focused to promote the production and spreading of short and original videos about science and technology to be consulted any kind of public.

During **Passion for Knowledge - Quantum 13** the winner videos of previous **ON ZIENTZIA** editions will be shown in many cultural and leisure centers. The aim is to get science out to citizens by using media in unusual spots as cine clubs, urban screens or cultural halls. Ernest Lluch Cultural Center, Kresala Cine Club or Leidor Cinema of Tolosa, among others, will take part in the initiative.

Moreover, the 4th edition of **ON ZIENTZIA** is already on. Participants are invited to submit their less than 5 minutes videos through the site [www.onzientzia.tv](http://www.onzientzia.tv). from 23rd of October. Videos can be shot in Basque, Spanish or English.





## Encounters with Students

# top@dipc

*Zientziarekin solasean!*

As in previous years, it is with great pleasure that the **Donostia International Physics Center** presents the 2013 edition of **top@dipc - Zientziarekin solasean!** the **Encounters between Nobel laureates and High school students**. These encounters have the support of the Basque Government's Garatu program and the special collaboration of DIPC's private patrons.

The principal aim of these encounters, which have been held annually since 2009, is to foster students' interest in science and technology and to kindle a passion for knowledge in their young minds.

This year we have scheduled **three encounters**: one in **Donostia-San Sebastian**, another in **Bilbao** and, for the first time, a third one in **Vitoria-Gasteiz**. The informal nature of the encounters is maintained, offering young students the chance to chat with top-level scientists, including various Nobel laureates, and ask them directly their questions. There are around 80 participating schools and more than 500 students and teachers in total.

In addition to Pedro M. Echenique, who will act as both chair and presenter, each encounter will be attended by two or three internationally renowned researchers from different fields, selected from among the guest speakers at **Passion for Knowledge – Quantum 13**.

	Monday 30 SEPT.	Wednesday 2 OCT.	Thursday 3 OCT.
	GIPUZKOA	ARABA	BIZKAIA
10:00 - 13:30	Student Encounters Eureka! Scientific Museum, Donostia	Student Encounters Artium Museum, Vitoria-Gasteiz	Student Encounters Bizkaia Aretoa, Bilbao
	Dame Jocelyn BELL BURNELL Astrophysics	Aaron CIECHANOVER Biomedicine	Dudley HERSCHBACH Physics-Chemistry
	Juan Ignacio CIRAC Theoretical Physics	Rafael YUSTE Neurobiology	Sir John PENDRY Photonics
	Claude COHEN-TANNOUJJI Physics		



# Workshops for Young Researchers

**Passion for Knowledge - Quantum 13** includes various training workshops and a very special workshop, led to the university community and **particularly young local researchers, doctoral students, Master students and so on.**

## Training Workshops

Coordinated by the **Chair of Scientific Culture of the UPV/EHU**, the goal of these workshops is to provide young researchers with tools for communication and valorization of their research work. We want to train scientists who can disclose and adequately convey their research to society.

There are programmed three different workshops, which will be repeated in Bilbao and Donostia-San Sebastian.

- **Scientific presentation.** Workshop to develop oral scientific communications skills. Tips to present your scientific results to the scientific community. It will be offered by **Gonzalo Álvarez**, *El arte de presentar*.

- **Science popularization.** Workshop on how to communicate and spread science among the general public. The lecturers will be **José Ignacio Latorre**, Professor of the Universitat of Barcelona and **Cesar Tomé**, science popularizer and editor of *Mapping Ignorance* blog.

- **Valorization of research.** Workshop on promotion of research and entrepreneurship strategies, offered by **Asier Rufino** from *Tecnalia Ventures*.

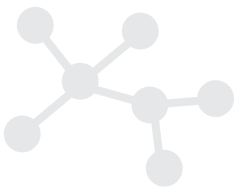
## Nobel Pitch

We present a very special workshop, which we have called the Nobel Pitch, based on what is known as the "**elevator pitch**", a technique of rapid communication to convince investors. The idea is that a young researcher tells a Nobel Prize about his or her work in the time that it would take to ride in an elevator.

During this workshop, selected young postdoctoral researchers from different areas (biology, physics and chemistry), will have the opportunity to interact and present their work to the four Nobel Prizes invited to **Passion for Knowledge - Quantum 13**.

This workshop is coordinated by **Ikerbasque**, the Basque Foundation for Science in collaboration with the UPV/EHU.

	Tuesday 1 OCT.	Wednesday 2 OCT.	Thursday 3 OCT.	Friday 4 OCT.
GIPUZKOA	NOBEL PITCH 11:00 - 13:30 nanoGUNE, Donostia	Workshop III: VALORIZATION 9:00 - 13:30 Tecnalia, Donostia	Workshop I: PRESENTATION 9:00 - 13:30 CFM, Donostia	Workshop II: POPULARIZATION 9:00 - 13:30 CFM, Donostia
BIZKAIA		Workshop I: PRESENTATION 9:00 - 13:30 Bizkaia Aretoa, Bilbao	Workshop II: POPULARIZATION 9:00 - 13:30 Bizkaia Aretoa, Bilbao	Workshop III: VALORIZATION 9:00 - 13:30 Tecnalia, Derio



Scientific Program

## Scientific Workshop BRANDT RITCHIE WORKSHOP

The program of **Passion for Knowledge – Quantum 13** also includes an international scientific workshop focusing on a topic of interest for the local community of researchers: the **30th Brandt Ritchie Workshop (BRW)**.

This edition pays tribute to **Rufus Ritchie**, an outstanding physicist who has made seminal contributions to the field of condensed matter physics and the interaction of particles with matter. Prof. Rufus Ritchie is Doctor Honoris Causa from the University of the Basque Country.

The BRW workshop is held at DIPC headquarters from October 1 to October 4, with the participation of around 80 researchers from the area of material physics.

The topics within the BRW workshop will cover various fields of condensed matter physics or materials science:

- Particle-solid interactions with special attention to charge exchange, energy loss and related phenomena.
- Collective excitations in low-dimensional systems.
- Induced excitation of surface and bulk plasmon states.
- Dynamic charge states in ion-solid interactions.
- Electron dynamics in nanostructures.
- Photonic and transport properties of materials.
- Radiation interaction with organic and inorganic nano-materials.
- Related processes on surfaces, and in interfaces and nanostructures ...



# Keynote Speakers



## Astrophysics star forgotten in the Nobel firmament

### Dame Jocelyn BELL BURNELL

Fellow of the **Royal Society** and Professor of the **University of Oxford**

A British astrophysicist. She graduated from the University of Glasgow with a BSc degree in Natural Philosophy (Physics) in 1965, and obtained her PhD from the University of Cambridge in 1969. As a postgraduate student at Cambridge, she discovered the first radio pulsar with her thesis supervisor Antony Hewish; for this Hewish shared the Nobel Prize in Physics with Sir Martin Ryle. After finishing her PhD, Bell Burnell worked at several universities and institutions in Britain, and was also a visiting professor at Princeton University in the United States. She was Dean of Science at the University of Bath (2001-04), and President of the Royal Astronomical Society from 2002-2004. President of the Institute of Physics (2008-2010), she is currently a

Visiting Professor of Astrophysics at the University of Oxford and a Fellow of Mansfield College.

Although Bell was not included as a co-recipient of the Nobel Prize, which stoked some controversy at the time, she has been honoured by many organizations. Among other awards, she received the Albert A. Michelson Medal of the Franklin Institute of Philadelphia in 1973, the Herschel Medal of the British Royal Astronomical Society in 1989 and the Magellanic Premium of the American Philosophical Society in 2000. She has been awarded several honorary degrees too. Fellow of the Royal Society in 2003, she was made a Dame Commander of the Order of the British Empire in 2007.



Photo: www.scisoc.or.th

## Discovering how proteins are marked for degradation

### Aaron CIECHANOVER

**2004 Nobel Prize in Chemistry** shared with Avram Hershko and Irwin Rose for the discovery of the process by which proteins are marked for degradation

He was born in Haifa, Israel. He is a Distinguished Research Professor at the Technion - Israel Institute of Technology in Haifa. He received his M.Sc. (1971) and M.D. (1975) from the Hebrew University in Jerusalem, and his D.Sc. (1982) from the Technion. There, as a graduate student with Dr. Avram Hershko and in collaboration with Dr. Irwin A. Rose from the Fox Chase Cancer Center in Philadelphia, USA, they discovered that the covalent attachment of ubiquitin to a target protein signals it for degradation.

They deciphered the mechanism of conjugation, described the general proteolytic functions of the system, and proposed a model according to which this modification serves as a recognition signal for a specific downstream protease. As a postdoctoral fellow with Dr. Harvey Lodish at the MIT, he continued his studies on the ubiquitin system and made additional important discoveries. Over the years it has become clear that ubiquitin-mediated

proteolysis plays major roles in numerous cellular processes, and aberrations in the system underlie the pathogenetic mechanisms of many diseases, among them certain malignancies and neurodegenerative disorders. Consequently, the system has become an important platform for drug development.

Among the numerous prizes Ciechanover received are the 2000 Albert Lasker Award, the 2003 Israel Prize, and the 2004 Nobel Prize (Chemistry; shared with Drs. Hershko and Rose). Among many distinguished academies, Ciechanover is a member of the Israeli National Academy of Sciences and Humanities, the Pontifical Academy of Sciences of the Vatican, the American Academy of Arts and Sciences (Foreign Fellow), the National Academy of Sciences of the USA (Foreign Associate), and the Institute of Medicine of the National Academy of Sciences of the USA (Foreign Associate).



Photo: www.abc.es

## Towards the quantum computer

### Juan Ignacio CIRAC

**The Prince of Asturias Prize in 2006** and Director of the **Max Planck Institute of Quantum Optics** (Garching, Germany)

Born in Manresa, Spain. In 1988, he graduated in Theoretical Physics at the Complutense University, Madrid, and gained his PhD in 1991. He has been a member of the Max Planck Society since 2001, the year when he was appointed director of the Max Planck Institute of Quantum Optics (Garching, Germany).

As an expert in quantum computation and its application in the field of information, the focus of his research work is the quantum theory of information. His theories propose that quantum computers will bring a new revolution to the field of information, as this will lead to more efficient communication and far greater security in both data processing and bank transfers.

He is a corresponding member of both the Spanish and the Austrian academies of sciences, as well as of the American Physical Society. Cirac's work has obtained great many awards including the Felix Kuschenitz Prize at the Austrian Academy of Sciences in 2001, the Quantum Electronics from the European Science Foundation in 2005, the Prince of Asturias Prize for Scientific and Technical Research in 2006, the Frontiers of Knowledge and Culture Award for basic science given by the BBVA Foundation in 2008, the 2010 Franklin Medal and, most recently, the Wolf Foundation prize in Physics 2013.



Photo: <http://www.wunitv.com/>

## Atom hunter

### Claude COHEN-TANNOUDJI

He received, together with Steven Chu and William Phillips, **the 1997 Nobel Prize in Physics** for the development of methods to cool and trap atoms with laser light

French physicist born in Constantine (Algeria), he graduated in Physics and received his PhD from the École Normale Supérieure (ENS) in Paris in 1962. In 1960, he joined the Centre National de la Recherche Scientifique (CNRS), a connection he maintained until 1964 when he was appointed Professor at the University of Paris.

In 1973, he was appointed as Professor of atomic and molecular physics at the Collège de France in Paris, a position that he held for many years. His teaching experience led him to publish several textbooks, which are well appreciated by undergraduate and graduate physics students.

He pioneered the research into the various mechanisms that can be used to slow down, cool and trap atoms with a laser beam. Cohen-Tannoudji and his team were among the first to cool atoms to very low temperatures, lower than one millionth of a degree above absolute zero. The techniques designed by Cohen-Tannoudji and other scientists have resulted in various specific applications, such as more accurate atomic clocks and more precise atomic interferometers and gyroscopes to measure the force of gravity and rotation speed. These techniques have been also essential for producing new states of matter like Bose Einstein condensates. He received, with Steven Chu and William Phillips, the 1997 Nobel Prize in Physics for the development of methods to cool and trap atoms with laser light.



Photo: [www.johnmfulton.co.uk](http://www.johnmfulton.co.uk)

## Nobel Prize who starred in The Simpsons

### Dudley HERSCHBACH

Along with his collaborator Yuan T. Lee and the chemist John C. Polanyi, he received **the 1986 Nobel Prize in Chemistry**, for their contributions concerning the dynamics of elementary chemical processes

Born in San Jose (California). He received his B.S. degree in Mathematics (1954) and M.S. in Chemistry (1955) at Stanford University, followed by an A.M. degree in Physics (1956) and Ph.D. in Chemical Physics (1958) at Harvard University. He started lecturing in physics and chemistry at Berkeley University in 1958. In 1963 he returned to Harvard as Professor of Chemistry where he became Baird Professor of Science (1976-2003). He is now a Research Professor (Emeritus) at Harvard University. He also joined the Texas University faculty in 2005 as a part-time Professor of Physics.

Professor Herschbach is a member of many academies and institutions and has received numerous international honours and awards. Along

with his collaborator Yuan T. Lee and the Canadian chemist John C. Polanyi, he received in 1986 the Nobel Prize in Chemistry, for their contributions concerning the dynamics of elementary chemical processes. Herschbach is a passionate advocate of science education and science for the general public. He frequently lectures students of all ages, imbuing them with his infectious enthusiasm for science and discovery. He serves as Chair of the Board of Trustees of Science Service, which publishes Science News and conducts the Intel Science Talent Search and the Intel International Science and Engineering Fair. Herschbach also lent his voice for The Simpsons' Treehouse of Horror XIV episode, where he presents the Nobel Prize in Physics to Professor Frink.





Photo: www.irb.hr

## Architect of the molecular scaffold

### Jean-Marie LEHN

He shared the **Nobel Prize in Chemistry in 1987** with Pedersen and Cram for his studies on the chemical basis of "molecular recognition"

Born in Rosheim, France. He studied chemistry at the University of Strasbourg, where he gained his PhD in 1963. Following his post doctorate studies, he spent a year at Harvard University working with Professor Robert Burns Woodward on the chemical synthesis of vitamin B12. He was appointed Professor of Chemistry at Strasbourg University in 1970, and joined the faculty at the prestigious Collège de France, Paris, in 1980.

He shared the Nobel Prize in Chemistry in 1987 with Pedersen and Cram for his studies on the chemical basis of "molecular recognition" (i.e. the way in which a receptor molecule recognizes and selectively binds a substrate), which also plays a fundamental role in biological processes.

Over the years his work led him to the definition of a new field of chemistry, which he has proposed calling "supramolecular chemistry" as it deals with the complex entities formed by the association of two or more chemical species held together by non-covalent intermolecular forces, whereas molecular chemistry concerns the entities constructed from atoms linked by covalent bonds. Subsequently, the area developed into the chemistry of "self-organization" processes and more recently towards "adaptive chemistry".

Lehn is a member of many academies and institutions and has received numerous international honours and awards.



## Radiography of life's structure

### Amand LUCAS

Professor of **Physics at the University of Namur** (Belgium) and member of the Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique.

Amand Lucas obtained his PhD in Physics in 1966 from the University of Liège, Belgium. He held a research appointment from the Belgian National Science Foundation during the period from 1962 to 1974. In 1967 and 1968 he did Postdoctoral Research at the Battelle Memorial Institute in Columbus, Ohio, USA. In 1970 he was visiting scientist at the ICTP (International Centre for Theoretical Physics) in Trieste, Italy. From 1970 to 1972, he worked at ESTEC (European Space Research and Technology Centre) in Noordwijk, Holland. In 1974, he was appointed Professor of Physics at the University of Namur where he worked until his retirement in 2002. During this tenure he took two sabbatical leaves first at IBM Research Center in Yorktown, N.Y. in 1977-78 and then at IBM Almaden, CA in 1986-87.

As a theoretical physicist, Amand Lucas has worked in the field of Condensed Matter Physics, focussing on Surface Physics. In 1985, he was awarded the Belgian Francqui Prize in Exact Sciences for his works in these areas. In 2001 he obtained the Wernaers Prize for his innovative teaching on the structural biology of DNA. He is a Fellow of the American Physical Society since 1983. He is a member of the Académie Royale des Sciences, des Lettres et des Beaux Arts de Belgique and of the Academia Europaea.

Amand Lucas is the author of several hundred research papers, books and monographs.





Photo: www.ccc.gob.mx

## From fly to human

### Ginés MORATA

Prince of Asturias Award for Scientific and Technical Research in 2007.

Ginés Morata graduated from the Complutense University of Madrid with a degree in Biology, before going on to earn his PhD in 1973. He is currently a research professor at the Severo Ochoa Centre for Molecular Biology, which is jointly run by Spain's Higher Council for Scientific Research (CSIC) and the Autonomous University of Madrid (UAM). He was director of this centre from 1990-1991. Professor Morata specialises in development genetics, focusing particularly on the study of the biological architecture of the *Drosophila melanogaster* fly. The genetic study of this fly (commonly known as the fruit fly) enables us to learn more about the biology of human development and will hopefully, in the future, lead to further discoveries regarding the cellular processes

involved in organ regeneration. These breakthroughs may help develop new treatments for cancer and could even lead to the discovery of anti-aging techniques for humans.

Prof. Morata has conducted his research in a number of different institutions, including both Oxford and Cambridge Universities in the UK, the University of California in the US and various centres in France and Switzerland. He has received numerous awards, including the Santiago Ramón y Cajal National Research Award in 2002, the Gold Medal of Andalusia in 2003, the Mexican Award for Science and Technology in 2004 and the Prince of Asturias Award for Scientific and Technical Research in 2007.



Photo: The Optical Society

## The "invisibility cloak" man

### Sir John PENDRY

Dirac Prize (1996) and fellow of the Royal Society

Born in England. He has been working at the Blackett Laboratory, Imperial College London (UK) since 1981.

He began his career in the Cavendish Laboratory at the University of Cambridge, followed by six years at the Daresbury Laboratory of the Science and Technology Facilities Council (UK), where he headed the theory group. In collaboration with the Marconi Company, he designed a series of completely novel artificial materials, or "metamaterials", with properties not found in nature. Successively metamaterials with negative electrical permittivity, then with negative magnetic permeability were designed and constructed. This project culminated in the proposal

for a 'perfect lens' whose resolution is unlimited by wavelength. He is popularly known for his research into refractive indexes and the creation of the first practical "Invisibility Cloak".

John Pendry was head of the physics department at Imperial College London and principal of the Faculty of Physical Sciences. The long list of awards he has received includes, among others, his post as fellow of the Royal Society (1984), honorary fellow of Downing College at Cambridge University, the Dirac prize (1996), the Royal Medal of the Royal Society (2006), as well as being knighted for his services to science (2004).



## Nano universe explorer

### José María PITARKE

Director of CIC nanoGUNE and Professor of the University of the Basque Country

Prof. José María Pitarke is the director of CIC nanoGUNE since its creation in 2006. He studied Physics at the University of the Basque Country, where he received his PhD degree with distinction in 1990. During his PhD work, he investigated some aspects of tunneling spectroscopy and electron and photon emission in solids. After a postdoctoral stay at the Oak Ridge National Laboratory (USA), he obtained, in 1993 a tenured position at the University of the Basque Country (UPV/EHU). He combined his work at the UPV/EHU with sabbatical semesters at various US Universities and Imperial College of London (UK). Since 2000, he has been full professor of condensed matter physics at the UPV/EHU. Since 2005, he has been By-Fellow of the Churchill College of the University of Cambridge. His research interests include condensed matter theory, and many-electron interactions in solids, surfaces, and nanostructures.

In February 2006, he was appointed director-general of the Nanoscience Research Center nanoGUNE, at the time of its creation; he joined nanoGUNE in September 2006, without completely abandoning his obligations at the University. Barely a few months after the opening of nanoGUNE in January 2009, he received a special mention by the jury of the 9th Manuel Laborde Werlinden prize for his business initiative on graphene. He was a driving force of the start-up company Graphenea, which was founded in April 2010 as a joint venture of private investors and nanoGUNE, with the mission of marketing good-quality graphene wafers and developing graphene-based technologies.

In February 2013, he also became the president of the Elhuyar Foundation for the popularization of science and technology.



Photo: www.abc.es

## Knocking on Heaven's Door

### Lisa RANDALL

Professor of Harvard University and Member of the National Academy of Sciences of America

Professor Randall earned her PhD from Harvard University and held professorships at MIT and Princeton University before returning to Harvard in 2001. She studies theoretical particle physics and cosmology at Harvard. Her research connects theoretical insights to puzzles in our current understanding of the properties and interactions of matter. She has developed and studied a wide variety of models to address these questions, the most prominent involving extra dimensions of space.

Randall's studies have made her among the most cited and influential theoretical physicists and she has received numerous awards and honors for her endeavors. She is a member of the National Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, and Honorary Member of the Royal Irish Academy, among others. In 2003, she received the Premio Caterina Tomassoni e Felice Pietro Chisesi Award, from the

University of Rome, La Sapienza, in 2006, the Klopsteg Award from the American Society of Physics Teachers for her lectures and in 2007 the Julius Lilienfeld Prize from the American Physical Society for her work on elementary particle physics and cosmology and for communicating this work to the public. In 2012, she was the recipient of the Andrew Gemant Award from the American Institute of Physics.

Randall has also had a public presence through her writing, lectures, and radio and TV appearances. Randall's books, *Warped Passages: Unraveling the Mysteries of the Universe's Hidden Dimensions* and *Knocking on Heaven's Door: How Physics and Scientific Thinking Illuminate the Universe and the Modern World* were both on the New York Times' list of 100 Notable Books of the Year. *Higgs Discovery: The Power of Empty Space* was released in 2012. Randall has also pursued art-science connections, writing a libretto for an opera.



## A reference of contemporary Basque literature

### Arantxa URRETABIZKAIA

Member of the Basque Language Academy –Euskaltzaindia–

Born in Donostia-San Sebastian, Arantxa Urretabizkaia is a member of the Basque Language Academy – Euskaltzaindia and one of the most prominent figures in the field of contemporary Basque literature. The start of her career coincided with the resurgence of Basque culture during the 1960s and 1970s, and indeed she was a member of the Argia group and the publishing house Lur. She has a degree in History and since 1977 has worked as a journalist in many different media organisations, including both the written press (Egin, Deia, El Mundo and El Diario Vasco) and radio and television (Euskal Irrati Telebista).

As a poet she debuted with a long poem entitled San Pedro bezperaren ondokoak, published in 1972. Some

years later she published a book of poems called Maitasunaren magalean, and received the National Critics' Award in 1982. In the world of prose, she is best known for her novel Zergatik Panpox? (1979) and her latest work, 3 Mariak (2010), also won the Critics' Award. Part of her work has been translated into Spanish and other languages.

She has worked as a film scriptwriter and has sat on the judges' panel in several literary competitions, including the Basque Awards. She is also a member of the judges' panel of the Donostia-San Sebastian International Film Festival, in the New Directors Award section.



## Obama's scientific brain

### Rafael YUSTE

Leader of the **Brain Activity Map Project** and Professor of Columbia University

He pioneered the launching of the Brain Activity Map Project, a large-scale international effort to record and manipulate the activity of every neuron in brain circuits. This project has recently been sponsored by the Obama administration as the BRAIN initiative.

Rafael Yuste is Professor of Biological Sciences and Neuroscience at Columbia University. He was born and educated in Madrid, where he obtained his MD at the Universidad Autónoma in the Fundación Jimenez Diaz Hospital. After a brief research period in Sydney Brenner's group at the LMB in Cambridge, UK, he did Ph.D. studies with Larry Katz in Torsten Wiesel's laboratory at Rockefeller University in New York. He then moved to Bell Labs, where he spent four years as a postdoctoral student of David Tank and Winfried Denk in the Department of Biological Computation, within the Physics Division. In 1996 he joined the Department of Biological Sciences at

Columbia University. In 2005 he became HHMI Investigator and co-director of the Kavli Institute for Brain Circuits at Columbia.

Dr. Yuste and his laboratory are pursuing a "reverse engineering" strategy to understand the function of the cortical microcircuit, a basic element of cortex architecture. To study these questions, Yuste has pioneered the development and application of laser imaging techniques, such as calcium imaging of neuronal circuits, two-photon imaging and photostimulation using caged compounds and holographic spatial light modulation microscopy. These technical developments have resulted in several patents, two of which are commercially licensed.

Yuste has obtained many awards for his work, including that of New York City Mayor and the Society for Neuroscience's Young Investigator Awards.

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**Passion for Knowledge - Quantum 13** is hosted by the **Donostia International Physics Center (DIPC)**, within the framework of **Euskampus**, the Campus of International Excellence of the **University of the Basque Country (UPV/EHU)**.

### DIPC

The Donostia International Physics Center lead by Pedro Miguel Echenique is a research center that started activity in 2000. The main goal of DIPC is to promote and catalyze high-level basic and oriented research in Condensed Matter Physics and Materials Science. Since its creation, the DIPC has been an open institution, linked to the University of the Basque Country.

### Excellence in research

Since its very conception DIPC has stood for the promotion of excellence in science. This tall order demands a platform in which ideas are freely exchanged, new objectives are set and shared, and new personal bonds established. DIPC is a space in which the enthusiasm for discovery reigns over bureaucracy, convention and routine, which attracts world-class scientists who become involved in running exciting scientific projects at the frontier of science.

The DIPC highly dynamic research community is **nucleated around the great scientific talent of the University of the Basque Country**, which plays host to a large international visiting researchers community.

### Excellence in communication

DIPC is a center devoted to research at the cutting-edge of science, but it also assumes the responsibility of conveying scientific knowledge to society, because it is firmly convinced that scientific culture contributes to the progress and freedom of society. The center offers meeting points, like this festival, to bring science to the citizen. DIPC is committed to generate an intellectual climate which triggers curiosity, interest, fascination, enthusiasm and passion for knowledge, showing science as a cultural activity accessible and attractive to all audiences.

## Campus of International Excellence **euskampus**

In 2010, the Spanish Ministry for Education awarded the **University of the Basque Country** the "Campus of International Excellence" seal for its project known as **Euskampus**. Under the slogan "One University, One Country, One Campus", Euskampus seeks to combine the excellence and internationalisation of the University and link it to the Country through four main areas of specialisation:

- + **Innovative Processes and New Materials**
- + **Sustainable Eco-systems and Environmental Technologies.**
- + **Quality of Life and Healthy Ageing.**
- + **Social Innovation**

The key aspect of the Euskampus project is the **private-public alliance** comprising UPV/EHU, DIPC and Tecnalia Corporation. The project has always enjoyed the endorsement of the Basque Public Administrations and of the main entities of the Basque Network for Science, Technology and Innovation.

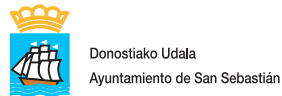
It is a project based on knowledge, on technology, on innovation and internationalisation, but above all on people, on their capacity to innovate, their creativity and their social responsibility.



## Organizers



This festival was made possible with the participation and support of public administrations, our patrons and collaborators, and you. Many thanks.





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