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#P4Kfestival

dipcc Donostia
International
Physics
Center

19

P4K

PASSION FOR
KNOWLEDGE

**General
Programme**

**30 September - 5 October
2019**

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Bilbao
Pamplona
Bergara

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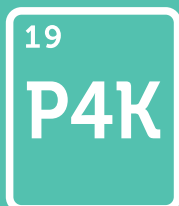
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PASSION FOR KNOWLEDGE

The Passion for Knowledge (P4K) festival is a collective celebration of learning and curiosity involving the active participation of thousands of citizens. The festival's fourth edition will be held this year from 30 September to 5 October 2019 in San Sebastián (its main venue), although complementary activities will also be organised in the cities of Bilbao, Pamplona and Bergara. P4K is organised by Donostia International Physics Center (DIPC), a research centre with headquarters in San Sebastián.

This large-scale event features many prestigious researchers who are the brilliant minds behind some of the most important scientific discoveries of recent years. It is a luxury and a privilege that can be enjoyed by everyone, since the talks held in the Victoria Eugenia Theatre, the Guggenheim Museum and the Baluarte Conference Centre are open to the general public, allowing anyone interested in science to continue learning alongside Nobel Laureates and world-class experts.

In addition to the main talks, the varied programme also includes many other activities targeted at different audiences, such as encounters between secondary school students and scientists, Naukas sessions, exhibitions, children's workshops, performances and screenings, among others.

2019 is the International Year of the Periodic Table of Chemical Elements and Passion for Knowledge will pay tribute to one of its components: tungsten, also known as wolfram (W), which was isolated in Bergara in 1786 by the Elhuyar brothers.

Sponsors

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P4K

DIPC is funded by the following institutions:











P4K Festival collaborators:



donostiasustapena
fomento sansebastián



Festival Programme

Monday, 30 SEP		Tuesday, 1 OCT		Wednesday, 2 OCT	
San Sebastian morning					
				10:00	ENCOUNTERS 
				-	Eureka! Zientzia Museoa,
				13:30	San Sebastian
					- Dame Jocelyn BELL BURNELL
					- Jean-Pierre SAUVAGE
					- Juan Ignacio CIRAC
San Sebastian afternoon					
Victoria Eugenia Theatre					
18:00	OPENING 	17:30	PLENARY LECTURES 	17:30	PLENARY LECTURES 
-	- Iñigo URKULLU	-	- Juan Ignacio CIRAC	-	- María MARTINÓN-TORRES
18:30	- Markel OLANO	19:30	- Albert FERT	19:30	- Sir John PENDRY
	- Eneko GOIA		- Barry BARISH		- Ginés MORATA
	- Pedro Miguel ECHENIQUE				
18:30	PLENARY LECTURES 				
-	- Dame Jocelyn BELL BURNELL				
19:50	- Serge HAROCHE	19:30	IKERBASQUE AWARDS 	19:30	BERTSO PASSION 
		-	- Maia GARCIA VERGNIORY	-	- Amets ARZALLUS
20:00	EHU Symphony Orchestra 	20:30	- Aitziber LÓPEZ-CORTAJARENA	20:30	- Andoni EGAÑA
-					- Maialen LUJANBIO
20:20					- Iñaki MURUA
					- William FRIEDMAN
					- Dudley HERSCHBACH
					- María MARTINÓN-TORRES
					- Jean-Pierre SAUVAGE
San Sebastian all day					
08:30	CREATIVIUM	08:30	CREATIVIUM	08:30	CREATIVIUM
-	UPV/EHU, Centro Carlos	-	UPV/EHU, Centro Carlos	-	UPV/EHU, Centro Carlos
20:30	Santamaría, San Sebastian	20:30	Santamaría, San Sebastian	20:30	Santamaría, San Sebastian
09:00	SCIENTIFIC SCHOOL	09:00	SCIENTIFIC SCHOOL	09:00	SCIENTIFIC SCHOOL
-	CFM y UPV/EHU Ignacio	-	CFM y UPV/EHU Ignacio	-	CFM y UPV/EHU Ignacio
18:00	Mª Barriola, San Sebastian	18:00	Mª Barriola, San Sebastian	18:00	Mª Barriola, San Sebastian
Other cities					
		10:00	PASSION FOR WOLFRAMIUM		
		-	Real Seminario, Bergara		
		11:30	- Dudley HERSCHBACH		
			- Maria VALLET-REGÍ		
			- Pedro Miguel ECHENIQUE		

Thursday, 3 OCT		Friday, 4 OCT		Saturday, 5 OCT	
San Sebastian morning					
10:00	Phd TRAINING			10:00	PASSION TXIKI
-	DIPC, San Sebastian			-	Club Room, Victoria Eugenia
12:30	- Dudley HERSCHBACH			13:00	Theatre, San Sebastian
	- Sir John PENDRY				- Ana GALARRAGA
	- Maria VALLET-REGÍ				
	- César TOMÉ				
San Sebastian afternoon					
Victoria Eugenia Theatre					
17:30	PLENARY LECTURES	17:30	PLENARY LECTURES	17:30	SPECIAL NAUKAS PASSION
-		-		-	
19:30	- Nekane BALLUERKA	19:30	- Maria VALLET-REGÍ	18:30	- Xurxo MARIÑO
	- William FRIEDMAN		- Christophe ROSSEL		- Oswaldo DIGÓN
	- Jean-Marie LEHN		- Jean-Pierre SAUVAGE		
19:30	NAUKAS PASSION	19:30	NAUKAS PASSION	18:30	PLENARY LECTURES
-		-		-	
20:30	- Javier ARMENTIA	20:30	- Natalia RUIZ ZELMANOVITCH	19:50	- Pamela DIGGLE
	- José Miguel VIÑAS		& Manolo GONZÁLEZ		- Dudley HERSCHBACH
	- César TOMÉ		- Ambrosio LICEAGA		
	- Helena MATUTE		- Joaquín SEVILLA		
	- Ignacio LÓPEZ GOÑI		- Déborah GARCÍA BELLO		
	- Gemma del CAÑO		- Almudena M. CASTRO		
San Sebastian all day					
08:30	CREATIVIUM	08:30	CREATIVIUM	09:00	CREATIVIUM
-	UPV/EHU, Centro Carlos	-	UPV/EHU, Centro Carlos	-	UPV/EHU, Centro Carlos
20:30	Santamaría, San Sebastian	20:30	Santamaría, San Sebastian	14:00	Santamaría, San Sebastian
09:00	SCIENTIFIC SCHOOL	09:00	SCIENTIFIC SCHOOL		
-	CFM y UPV/EHU Ignacio	-	CFM y UPV/EHU Ignacio		
18:00	Mª Barriola, San Sebastian	18:00	Mª Barriola, San Sebastian		
Other cities					
19:00	PLENARY LECTURES	10:00	ENCOUNTERS		
-	Guggenheim Museum, Bilbao	-	Guggenheim Museum, Bilbao		
20:30	- Albert FERT	13:30	- Albert FERT		
	- Barry BARISH		- María MARTINÓN-TORRES		
			- Christophe ROSSEL		
19:15	ON ZIENTZIA	19:00	PLENARY LECTURES		
-	Leidor Theatre, Tolosa	-	Baluarte, Pamplona		
21:45		20:30	- Pamela DIGGLE		
			- Jean-Marie LEHN		

Plenary Lectures

Nobel laureates and prestigious international researchers from many different scientific disciplines will share with the audience their passion and knowledge on a wide range of different subjects, including astrophysics, cosmology, quantum physics, botany, smart biomaterials and palaeoanthropology. Tales of exploration, scientific challenge and a large dose of passion for knowledge are the ingredients making up the festival's star dish!

The keynote talks will take place **every day in the Victoria Eugenia Theatre in San Sebastian**. Moreover, on 3 October, some of the guest lecturers will also be giving talks in the **Guggenheim Museum in Bilbao**, and on 4 October they will be in the **Baluarte Conference Centre in Pamplona**.

Entry to all keynote talks will be **free access and free of charge** until the venue is full, although prior **registration** is recommended, due to the venues' limited capacity.

Simultaneous interpreting will be available into Basque, Spanish and English, and all sessions will be streamed live.

Consult the programme on the following pages. The profiles of the guest scientists start on page 20.



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Pl
Plenary
Lectures

Target audience:
General public

Language:
Basque, Spanish and English
(Simultaneous
interpretation into Basque,
Spanish and English).

Main venue:
San Sebastian
Victoria Eugenia Theatre
Dates and Time:
30 SEP, 18:00 - 20:20
1 - 4 OCT, 17:30 - 20:30
5 OCT, 17:30 - 20:10
Capacity:
900 people

Other venues:
Bilbao
Guggenheim, Auditorium
Dates and Time:
3 OCT, 19:00 - 20:30
Capacity:
300 people

Pamplona
Baluarte, Sala Ciudadela
Dates and Time:
4 OCT, 19:00 - 20:30
Capacity:
300 people

Streaming:
Streamed live on
EITB Kosmos

Registration:
Free registration at
p4k.dipc.org


Plenary Lectures Programme


Public Lectures day-by-day

19




P4K

Monday, 30 SEP



 **Victoria Eugenia Theatre,**
San Sebastian

 **Master of ceremonies:**
Nora GONZÁLEZ and Juan Ignacio PÉREZ

Session language:
Euskera **EU** Español **ES** English **EN**

18:00 - 18:30	OPENING	
18:00	Opening Ceremony Iñigo URKULLU President of the Basque Government Markel OLANO President of the Provincial Council of Gipuzkoa Eneko GOIA Mayor of San Sebastian Pedro Miguel ECHENIQUE UPV/EHU Professor and President of DIPC	
18:30 - 19:50	PLENARY LECTURES	
18:30	Dame Jocelyn BELL BURNELL Astrophysics, Oxford University, UK Einstein, Eddington and a solar eclipse	EN
19:10	Serge HAROCHE Physics, Collège de France, France Reflections about the scientific truth	EN
20:00 - 20:20	CONCERT	
20:00	EHU Symphony Orchestra Concert	

Tuesday, 1 OCT

17:30 - 19:30	PLENARY LECTURES	
17:30	Juan Ignacio CIRAC Theoretical Physics, Max Planck Institut für Quantenoptik, Garching, Germany What will the supercomputers of the future be like?	ES
18:10	Albert FERT Condensed Matter Physics, Université Paris-Saclay, France Fundamental physics at the base of the technologies for information age	EN
18:50	Barry BARISH Physics and Astrophysics, Caltech y UC Riverside, USA From Einstein to Gravitational Waves	EN
19:30 - 20:30	IKERBASQUE AWARDS	
19:30	Maia GARCIA VERGNIORY Condensed Matter Physics, Ikerbasque researcher at DIPC Materials of the future	ES
20:00	Aitziber LÓPEZ-CORTAJARENA Bionanotechnology, Ikerbasque researcher in CIC biomaGUNE Protein engineering: The future of new therapies and biotechnology and biomaterials processes?	ES

Plenary Lectures Programme

Public Lectures day-by-day

Wednesday, 2 OCT

📍 **Victoria Eugenia Theatre,**
San Sebastian

Session language:

Euskera **EU** Español **ES** English **EN**


17:30 - 19:30	PLENARY LECTURES 
17:30	María MARTINÓN-TORRES Paleoanthropology, CENIEH National Research Center of Human Evolution, Spain ES Homo sapiens and the shadow of the cypress tree
18:10	Sir John PENDRY Photonics, Imperial College London, United Kingdom EN Capturing light on the nanoscale
18:50	Ginés MORATA Genetics, Centro de Biología Molecular Severo Ochoa, Spain ES Biology and Society in the 21st century: the manipulation of genetic information and the future of human Society
19:30 - 20:30	BERTSO PASSION  Presenter: Felix ZUBIA Doctor and versifier
	Amets ARZALLUS Versifier, Basque Country EU/ES/EN Andoni EGAÑA Versifier, Basque Country Maialen LUJANBIO Versifier, Basque Country Iñaki MURUA Versifier, Basque Country William FRIEDMAN Harvard University, USA Dudley HERSCHBACH Harvard University, USA María MARTINÓN-TORRES CENIEH National Research Center of Human Evolution, Spain Jean-Pierre SAUVAGE University of Strasbourg, France


Thursday, 3 OCT

📍 **Victoria Eugenia Theatre,**
San Sebastian


Session language:

Euskera **EU** Español **ES** English **EN**

17:30 - 19:30	PLENARY LECTURES 
17:30	Nekane BALLUERKA Behavioural Sciences Methods, University of the Basque Country (UPV/EHU), Basque Country EU El País Vasco y la Ciencia: el gran desarrollo de un pueblo pequeño
18:10	William FRIEDMAN Botany, Harvard University, USA EN Who discovered evolution?
18:50	Jean-Marie LEHN Supramolecular Chemistry, Université de Strasbourg, France EN Steps Towards Life: Chemistry!


19:30 - 20:30	NAUKAS PASSION Presenter: Javier PELÁEZ Naukas	
19:30	Javier ARMENTIA Pamplona Planetarium La vie en rose (science and society in a colour that suits them to a tee)	ES
19:40	José Miguel VIÑAS World Meteorological Organisation Art galleries are full of clouds	ES
19:50	César TOMÉ Euskampus Foundation Eureka? Really?	ES
20:00	Helena MATUTE University of Deusto Vulnerable-Mind	ES
20:10	Ignacio LÓPEZ GOÑI University of Navarra The yellow soup of the Ming dynasty	ES
20:20	Gemma del CAÑO Expert on pharmacy and food When you sound the alarm, I'll come back	ES

Friday, 4 OCT

 **Victoria Eugenia Theatre,**
San Sebastian

Session language:

Euskera **EU** Español **ES** English **EN**

17:30 - 19:30	PLENARY LECTURES	
17:30	Maria VALLET-REGÍ Smart Biomaterials, Universidad Complutense de Madrid (UCM)CIBER-BBN, Spain Silica nanoagent to combat bone disorders	ES
18:10	Christophe ROSSEL Physics, IBM Research- Zurich, Switzerland Is Artificial Intelligence heading towards a technological singularity?	EN
18:50	Jean-Pierre SAUVAGE Chemistry, University of Strasbourg, France Molecular Machines in Biology and in Chemistry	EN

p4k.dipc.org

 Abstracts of the plenary lectures at **p4k.dipc.org** website

 Streaming: Live at **EITB Kosmos** website

 Simultaneous interpreting in all lectures

Plenary Lectures Programme

Public Lectures day-by-day


19:30 - 20:30	NAUKAS PASSION Presenter: Javier PELÁEZ Naukas	
19:30	Natalia RUIZ ZELMANOVITCH NANOCOSMOS ERC at the Institute of Fundamental Physics (CSIC) Manolo GONZÁLEZ Institute of Astronomy of Andalusia (CSIC) Of stars and stories	ES
19:50	Ambrosio LICEAGA University of Navarra We never wanted flying cars	ES
20:00	Joaquín SEVILLA University of Navarra What you don't immediately see when you look at a dish of garlic mushrooms	ES
20:10	Déborah GARCÍA BELLO Universidade da Coruña Fashion is incredibly important	ES
20:20	Almudena M. CASTRO University of Madrid Music, war and peace	ES


Saturday, 5 OCT


 **Teatro Victoria Eugenia,**
San Sebastian

Session language:

Euskera **EU** Español **ES** English **EN**

17:30 - 18:30	ESPECIAL NAUKAS PASSION Presenter: Javier PELÁEZ Naukas	
17:30	Xurxo MARIÑO Universidade da Coruña Oswaldo DIGÓN Actor Coal	ES

18:30 - 19:50	PLENARY LECTURES	
18:30	Pamela DIGGLE Botany, University of Connecticut, USA Plants in our changing world	EN
19:10	Dudley HERSCHBACH Chemical Physics, Harvard University, USA Celebrating Mendeleev	EN

19:50 - 20:10	CLOSING	
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Bilbao

Thursday, 3 OCT

📍 **Guggenheim Museum, Auditorium**
Bilbao

Session language:
Euskera **EU** Español **ES** English **EN**

19:00 - 20:30	PLENARY LECTURES	
19:00	Albert FERT Condensed Matter Physics, Université Paris-Saclay, France Fundamental physics at the base of the technologies for information age	EN
19:40	Barry BARISH Physics and Astrophysics, Caltech and UC Riverside, USA From Einstein to Gravitational Waves	EN

Pamplona

Friday, 4 OCT

📍 **Baluarte, Ciudadela room**
Pamplona

Session language:
Euskera **EU** Español **ES** English **EN**

19:00 - 20:30	PLENARY LECTURES	
19:00	Pamela DIGGLE Botany, University of Connecticut, USA Plants in our changing world	EN
19:40	Jean-Marie LEHN Supramolecular Chemistry, Université de Strasbourg, France Steps Towards Life: Chemistry!	EN

Encounters with Students

Given their success in previous years, **Passion for Knowledge 2019** would not be complete without a new series of **top@DIPC - Zientziarekin solasean!, the Encounters between Nobel laureates and world-class researchers and high school students between 15 and 18 years** which DIPC has been organising every year since 2009.

The main aim of these encounters is to encourage young Basque students to consider a career in science and technology, and to imbue them with a passion for knowledge and learning. In this 11th edition, two encounters will be held, one in **San Sebastian** and the other in **Bilbao**. Each encounter will feature three internationally renowned researchers from different fields, specially selected from among the P4K 2019 guest speakers (see page 20), with **Pedro Miguel ECHENIQUE** acting as host and moderator.

SAN SEBASTIAN

Eureka! Zientzia Museoa

Wednesday, 2 Oct

Dame Jocelyn BELL BURNELL

Jean-Pierre SAUVAGE

Juan Ignacio CIRAC

BILBAO

Guggenheim Museum

Friday, 4 Oct

Albert FERT

María MARTINÓN-TORRES

Christophe ROSSEL



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To
Encounters

Target audience:

High School students

Capacity:

250-300 people per encounter

Language:

Basque, Spanish and English (Simultaneous interpretation)

Venues:

San Sebastian

Eureka! Zientzia Museoa

2 OCT, 10:00 - 13:30

Bilbao

Guggenheim Museum

4 OCT, 10:00 - 13:30

Streaming:

Streamed live on
p4k.dipc.org

Registration:

Free registration for schools

Target audience:

General Public

Capacity:

900 people

Language:

 Spanish (Simultaneous
 interpretation into Basque,
 Spanish and English)

Dates and Time:

3 and 4 OCT , 19:30 - 20:30

5 OCT, 17:30 - 18:30

Venue:
San Sebastian

Victoria Eugenia Theatre

Streaming:

Streamed live on

EITB Kosmos
Registration:

Free registration at

p4k.dipc.org

Naukas Passion

The public programme also includes the Naukas Passion session, organised in collaboration with the popular online scientific communication and dissemination platform **Naukas, science, scepticism and humour**. Naukas Passion is organised in collaboration with the The Chair of Scientific Culture of the University of the Basque Country. On Thursday 3 and Friday 4 October, after the keynote talks, some of Naukas' best collaborators will go up on stage in the Victoria Eugenia Theatre to offer the audience their own somewhat quirky take on a range of different scientific issues. **On Saturday 5 October**, the audience will be treated to a performance of 'CARBÓN' (COAL) a popular science show written by the neuroscientist and educator **Xurxo MARIÑO** and the comedian and actor **Oswaldo DIGÓN**.



Ikerbasque Awards

Physicist **Maia Garcia Vergniory** and the biochemist **Aitziber López-Cortajarena** won the **Ikerbasque** Prize in 2019. The festival will feature these two award-winning female scientists in a special session in which they will explain their scientific breakthroughs in the fields of topological materials and protein engineering, respectively.

See all the information about the talks on page 29.

Target audience:

General public

Dates and Time:

1 OCT , 19:30 - 20:30

Venue:
San Sebastian

Victoria Eugenia Theatre

 Streaming **EITB Kosmos**

 Registration **p4k.dipc.org**

Bertso Passion

During this year's Passion for Knowledge festival, we will once again be mixing science and the art of Basque extempore verse making (known as bertsolaritza in the Basque language). The session will feature **four scientists**, the minds behind some of the most important scientific discoveries of recent years, and **four bertsolaris**, highly talented Basque extempore verse singers.

Bertso Passion aims to combine scientists' unique outlook with the beauty and ingenuity of the bertsolaris' sung improvised poetry, taking the audience on a journey full of sense and sensibility and transporting them back to the origin of our species, the evolution of plants and the essence of chemistry.

Presenter: Felix ZUBIA

Versifier

Ametz ARZALLUS
Andoni EGAÑA
Maialen LUJANBIO
Iñaki MURUA

Scientific:

Dudley HERSCHBACH
María MARTINÓN-TORRES
Jean-Pierre SAUVAGE
William FRIEDMAN



On Zientzia

On Zientzia is a documentary-type audiovisual creation project which relies on citizen engagement and is organised by Elhuyar and DIPC within the framework of the TV show Teknopolis, produced by Elhuyar for Basque public television.

The **On Zientzia** competition aims to produce and disseminate original short videos on science and technology, targeted at audiences of all ages. The competition has been running for nine years now and has generated a collection of over 500 popular science videos. During this year's Passion for Knowledge festival, a selection of some of the best videos will be screened in different cultural and recreational centres.

www.onzientzia.tv/es/

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Be

Bertso Passion

Target audience:

General Public

Capacity:

900 people

Language:

Basque, Spanish and English (Simultaneous interpretation)

Dates and Time:

2 OCT, 19:30 - 20:30

Venue:

San Sebastian

Victoria Eugenia Theatre

Streaming:

Streamed live on
EITB Kosmos

Registration:

Free registration at
p4k.dipc.org

19

On

On Zientzia

Dates and time of the projections:

3 OCT, 19:15; 21:45

Venue:

Tolosa

Leidor Theatre

Target audience:

International Research
Community

Language:

English

Dates and Time:

30 SEP - 4 OCT, 09:00 - 18:00

Venue:

San Sebastian
CFM, Materials Physics
Center, CSIC-UPV/EHU UPV/
EHU, Ignacio María Barriola

Dynapeutics

The Passion for Knowledge 2019 programme of activities also includes an international summer school targeted at the scientific community in general, and particularly at PhD students and young postgraduate researchers. It will take place in San Sebastian from 30 September to 4 October.

Dynapeutics, as the school is called, will focus on the theory and applications of different computational methods for studying and simulating biomolecules in biological environments, which are relevant for the design and optimisation of molecular drugs, as well as for our understanding of biological processes at a molecular level.

dynapeutics2019.dipc.org/

Target audience:

General Public

Dates and Time:

23 SEP. - 5 OCT
Midweek, 08:30 - 20:30
Saturdays, 09:00 - 14:00

Venue:

San Sebastian
Ibaeta Campus,
Carlos Santamaria Center,
UPV/EHU

Creativium

All creative ideas require a prior process of preparation, during which thoughts mature and take form to culminate in what is known as the moment of enlightenment, or the Eureka! moment. This is the idea behind the Creativium photography exhibition, which will be open to the public from 23 September to 5 October in the Carlos Santamaria Centre at the University of the Basque Country's Ibaeta Campus. The exhibition traces the different stages of the creative process (preparation, incubation, enlightenment and verification) through artistic photographs of scientists engaged in their everyday work, accompanied by essays and literary texts. Creativium is one of the new initiatives of the Mestizajes programme, which the researcher Gustavo Ariel Schwartz has been leading and developing at the DIPC for some years now. The project will also be published as a photo-book in the coming months.

creativium.mestizajes.es



During this mini science festival, the youngest members of society will be able to participate in practical experiments and see what it feels like to be a scientists for a day. The event concludes with a performance of 'Bizitzaren laborategian' (In the laboratory of life), a scientific storytelling session full of surprises.

10:00 - 12:00 **I research**
Practical 1-hour workshops.

Targeted at children aged between 4 and 7.
Playing with polymers
Lights, colour...action!

Targeted at children aged between 8 and 12.
Chemistry in Action
Climate Change

12:15 - 13:00 **In the laboratory of life**
Cuentacuentos científico

Targeted at children aged between 4 and 8, accompanied by an adult (maximum 1 adult per child).

Ana GALARRAGA AIESTARAN, scientific communicator working at Elhuyar and author of the book 'Marikalanbre bizitzaren laborategian' (Marikalanbre in the laboratory of life), will be offering a live show featuring storytelling and experiments in which she uses everyday materials to convey values such as equality, respect, teamwork, perseverance and the importance of owning up to and accepting responsibility for one's mistakes.

Target audience:

Children ages 4 - 12

Capacity:

Practical workshops:
60 kids per hour

Scientific storyteller:

120 people (kids and adults).

Language:

Basque (no interpretation)

Dates:

Saturday, 5 OCT

Time:

10:00 - 13:00

Venue:

San Sebastian

Club room, Victoria Eugenia Theatre

Streaming:

Streamed live on
p4k.dipc.org

Registration:

Free registration at
p4k.dipc.org





Passion for
Wolframium

Target audience:

Students and adults

Capacity:

250 people

Language:

Basque, Spanish and
English (Simultaneous
interpretation)

Venue:

Bergara

Royal Seminary

1 OCT, 10:00 - 11:30

Passion for Wolframium

Given that 2019 is the International Year of the Periodic Table of Chemical Elements, the Passion for Knowledge (P4K) festival would like to pay tribute to one of its components: wolframium, also known as tungsten or wolfram (W), which was first isolated by the Elhuyar brothers in the Basque town of Bergara in 1783.

In 2018, Bergara was officially designated an 'Historic Site of Science' by the European Physical Society (EPS), in recognition of both this major scientific discovery and other breakthroughs made by the Bergara Laboratorium and Seminary. Only around ten places in the world have been honoured with this title, including the Curie Institute in France and the Niels Bohr Institute in Denmark.

Passion for Knowledge festival was delighted by the news, and in collaboration with the Laboratorium Museum and the Bergara Local Council has organised a special event called '**Passion for Wolframium**'. The event will be held at 10:00 in the morning, on 1 October, at the Seminary, and will feature two of the scientists participating in the festival.

Participants:

- Dudley HERSCHBACH, Nobel Laureate in Chemistry (1986)
- Maria VALLET-REGÍ, chemist and expert in intelligent materials, Jaume I Award (2018)

The scientist **Pedro Miguel ECHENIQUE** will be in charge of introducing the townsfolk of Bergara to these two illustrious guests and vice versa, after which the audience will have a chance to chat with them, ask them questions and share thoughts.



PhD Outreach
Training

Target audience:

Phd students

Dates:

3 OCT

Time:

10:00 - 12:30

Venue:

San Sebastian

Donostia International
Physics Center (DIPC)

PhD Training

We wanted to include dissemination training activities for young scientists within the framework of the 2019 Passion for Knowledge popular science festival.

Thus, a group of PhD students will engage in a series of activities aimed at enriching their experience and developing their communication skills:

10:00 - 11:00 **Get to know your teacher**

Discussions with three of the guest scientists will lead students to reflect on science and its social aspects.

- Dudley HERSCHBACH
- Sir John PENDRY
- Maria VALLET-REGÍ

11:30 - 12:30 **Dissemination through blogging**

PhD students will also participate in a workshop run by Cesar Tomé. The training session aims to encourage students to write a series of popular science articles on their projects, to be published on the blog **Mapping Ignorance**, a benchmark English-language portal edited by Cesar Tomé which features news and articles on cutting-edge scientific research.

Plenary Lectures



Nekane BALLUERKA

Behavioural Sciences Methods

University of the Basque Country (UPV/EHU)



Barry BARISH

Physics and Astrophysics

Caltech and UC Riverside, USA
Nobel Laureate in Physics 2017

The Basque Country and Science: the great development of a small country

Miren Nekane Balluerka is the President of the University of the Basque Country (UPV/EHU) and a lecturer in Behavioural Science Methods in the Faculty of Psychology.

Her research focuses mainly on methods for developing psychological assessment instruments and adapting them to different cultural contexts, as well as on the application of multi-level analysis models to the study of psychosocial phenomena.

Career and awards

Nekane Balluerka obtained her bachelor's degree from the University of the Basque Country in 1989 and earned a PhD from the same university in 1993, being awarded the Extraordinary Prize in both cases. After completing her degree, she began lecturing at the Faculty of Psychology and was appointed Full Professor of Behavioural Science Methods in 2009.

As a lecturer, she obtained the 'excellent' rating within the Docentiaz programme. She has participated in 43 research projects, in ten of them as the lead researcher. She has co-authored over a hundred scientific papers, as well as 26 books and nine book chapters. She has directed ten doctoral theses, 2 with the European Mention, 5 with the International Mention, 1 with the Basque Social Reality Prize, and 6 with the PhD Extraordinary Prize. She has presented nearly 200 contributions at national and international conferences, has been a guest speaker at over twenty conferences and has coordinated many symposiums, round table debates, workshops and summer courses in specialist forums.

She has been a visiting professor at Arizona State University, the University of California and the University of Manchester.

She is a member of the UEU (Udako Euskal Unibertsitatea - Basque Summer University) and a founding member of the Spanish Association for Behavioural Science Methodology (AEMCCO) and the European Association of Methodology (EAM). For four years (2011-2015) she was the Editor-in-Chief of the official journal published by this association: Methodology. European Journal of Research Methods for the Behavioural and Social Sciences.

She was an external advisor to the Agency for the Quality of the Catalan University System (AQU) for six years, and has served as Vice Dean of the Faculty of Psychology (2004-2006) and Pro Vice-Chancellor for Educational Quality and Innovation (2006-2009) and for Postgraduate Studies and International Relations (2012-2016) at the UPV/EHU. She was a member of the Academic Assessment Committee (2009-2012) and a member (2009-2012) and President of the Ethics Committee for Teaching Practice and Research with human beings at the UPV/EHU (2012-2013).

A key figure in the detection of gravitational waves

Barry Barish is an American physicist who was awarded the Nobel Prize in Physics in 2017 along with Rainer Weiss and Kip Thorne for 'decisive contributions to the LIGO detector and the observation of gravitational waves'.

In 2015, LIGO (Laser Interferometer Gravitational-Wave Observatory) detected a gravitational wave (a disturbance in the curvature of spacetime) coming from the merger of two black holes millions of light years away. After months of verifications, he finally demonstrated the existence of gravitational waves, which had been postulated by Einstein in 1915 on the basis of his General Theory of Relativity.

This scientific breakthrough was made possible by LIGO, a high-precision instrument comprising two interferometers located thousands of kilometres apart in Livingston (Louisiana) and Hanford (Washington), in the United States of America. Both interferometers have L-shaped arms stretching over several kilometres which detect subtle disturbances in the spacetime when a gravitational wave passes through the Earth.

Career and awards

Barry Barish has a B.A. in physics (1957) and a PhD in experimental high-energy physics (1962) from the University of California, Berkeley. After a brief time as a postdoctoral researcher, he became a research fellow at Caltech in 1963. During his early career, he worked on experiments at the Stanford Linear Accelerator Center and Fermilab, before joining the faculty at the University of California, Riverside, in 2018.

As well as the Nobel Prize in Physics (2017), Barry Barish has received many awards and accolades, including the Klopsteg Memorial Award (2002), the Enrico Fermi Prize (2016), the Smithsonian magazine's American Ingenuity Award (2016), the Henry Draper Medal (2017), the Giuseppe and Vanna Cocconi Prize (2017) and the Princess of Asturias Prize (2017). He has also been honoured as a Titan of Physics (2016).



Dame Jocelyn BELL BURNELL

Astrophysics

Oxford University, UK



Juan Ignacio CIRAC

Theoretical Physics

Max Planck Institut für Quantenoptik,
Garching, Germany

The person who discovered pulsars, the neutron stars which changed the way we see the universe

Dame Jocelyn Bell Burnell is an astrophysicist from Northern Ireland. While working as a research student at the University of Cambridge, she helped build a large radio telescope and in 1967 discovered a series of extremely regular radio pulses. Puzzled, she consulted her adviser, astrophysicist Antony Hewish, and their team spent the ensuing months eliminating possible sources of the pulses, which they jokingly dubbed LGM (for Little Green Men) in reference to the remote possibility that they represented attempts at communication by extraterrestrial intelligence. After she subsequently discovered several more regular patterns of radio waves and determined that they were in fact emanating from neutron stars. They had discovered pulsars: super-dense, highly-magnetic stars that spin rapidly and emit radio waves in an intense, narrow beam, not unlike a lighthouse.

The scientific discovery won a Nobel Prize in 1974, although despite being the first person to observe a pulsar, Bell was not included among the laureates, with the honour going instead to her supervisor, Antony Hewish, and the astronomer Martin Ryle.

Since that time, Dame Jocelyn Bell Burnell has become a role model for young students and female scientists all over the world. She has been awarded many prizes and has garnered many prestigious accolades. Recently, she donated 3 million dollars, the entire proceeds of the Breakthrough Prize in Fundamental Physics that she was awarded in September 2018, to help women and people from minority groups wishing to become physics researchers.

Career and awards

After earning a Bachelor's degree in Natural Philosophy (Physics) from the University of Glasgow in 1965, she did her postgraduate studies at the University of Cambridge, earning a PhD in 1969. She was a visiting professor at the University of Princeton, in the US, and is currently a guest lecturer in astrophysics at the University of Oxford and a fellow of Mansfield College. She served as President of the British Royal Astronomical Society from 2002 to 2004, as President of the Institute of Physics from 2008 to 2011 and as pro-Chancellor at Trinity College Dublin. She was also President of the Royal Society of Edinburgh from 2015 to 2017.

Her many accolades include the Albert A. Michelson Medal of the Franklin Institute of Philadelphia in 1973, the Magellanic Premium of the American Philosophical Society in 2000 and the Royal Medal of the Royal Society in 2015. She has also received many honorary titles and is a Fellow of the Royal Society, as well as another five academic institutions. In 2007, she was made a Dame Commander of the British Empire by Her Majesty Queen Elizabeth II. In 2010, Dame Jocelyn Bell Burnell was awarded the Royal Society Michael Faraday prize for excellence in communicating science.

One of the minds behind quantum computers

Juan Ignacio Cirac is a Spanish physicist who has proposed some of the most important ideas for applying quantum physics to computing. He is one of the minds behind quantum computers. For the past 18 years he has directed the Max Planck Institute of Quantum Optics and is a recipient of both the Prince of Asturias Award (2006) and the Wolf Prize (2013).

His research focuses on the quantum theory of information and quantum computing. Quantum computing has a different paradigm from current computing, which is based on bits and which processes information in only two states: zero and one (on or off). Quantum technology, on the other hand, works also by superimposing these states using 'quantum bits', also known as qubits. One key consequence of this is that certain problems which cannot be solved by a conventional computer would be feasible for a quantum one.

Career and awards

Ignacio Cirac earned a degree in physics from the Complutense University in Madrid in 1988 and a PhD in 1991. After lecturing at the Universities of Castilla-La Mancha (Spain) and Innsbruck (Austria), in 2001 he was appointed director of the Max Planck Institute of Quantum Optics (Garching, Germany) and is an honorary professor at the Technical University of Munich.

He is a Fellow of the Spanish Royal Academy of Sciences, as well as the German one (Leopoldina), a correspondent of the Austrian, Zaragoza and Barcelona Academies of Science and a Fellow of the American Physical Society. He has won many awards for his work, including the Felix Kuschenitz Prize from the Austrian Academy of Sciences in 2001, the European Physical Society's Quantum Electronics Prize in 2005, the Prince of Asturias Prize in 2006, the Blas Cabrera National Research Prize in 2007, the BBVA Foundation's Frontiers of Knowledge Prize in 2009, the Franklin Medal in 2010, the Niels Bohr Medal in 2013, the Wolf Prize in 2013, the Hamburg Prize for Theoretical Physics in 2015 and, more recently, the German Physical Society's Max Planck Medal and will receive the Micius Foundation's Micius Quantum Prize (China) in September 2019.

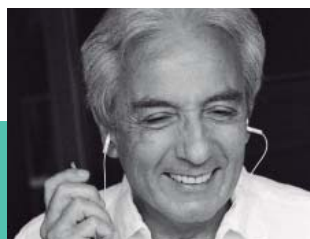
Plenary Lectures



Pamela DIGGLE

Botany

University of Connecticut, USA



Albert FERT

Condensed Matter Physics

Université Paris-Saclay, France
Nobel Laureate in Physics 2007

The woman who deciphered the evolution of plants

Pamela Diggie is a prestigious biologist specialising in plants. Her research focuses on discerning how evolution affects plant development. She is also the Editor-in-Chief of the American Journal of Botany.

Within her specialist field, she has researched the influence of adverse environmental conditions on plants, evolution in closely-related groups of plants and the differences between flowering plants. To study the evolutionary development of plants, Diggie analyses their gene expression, the characteristics of their cells and tissues and the traits they manifest throughout their lives.

Career and awards

After completing her undergraduate studies at the University of California at Santa Barbara, Diggie spent several years doing outreach at a state park near the San Diego desert, helping to overturn general perceptions by highlighting the wonderful diversity of plants that can be found there.

She is a Professor at the University of Connecticut (USA) and Head of the Department of Ecology and Evolutionary Biology. In the field of Botany, she has been a programme officer at the US National Science Foundation (a government agency in the United States) and President of the Botanical Society of America. She is fully committed to sharing her enthusiasm for plants through university teaching and intensive summer courses for postgraduate students, and even teaches classes to primary school pupils in remote regions of Alaska.

As much information as possible in the smallest possible space

In 1988, Albert Fert is a French physicist who discovered the giant magnetoresistance (GMR), large reduction of the electrical resistance of magnetic multilayered nanostructures induced by application of a magnetic field. Independently and at the same time, Peter Grünberg also discovered GMR in Germany. The two were jointly awarded the Nobel Prize in Physics in 2007.

The discovery of GMR is recognized as the birth of spintronics, a research field often described as a new type of electronics exploiting not only the electric charge of the electrons but also their magnetism (their spin). Several contributions to the development of this field came from Albert Fert. GMR and spintronics have already important applications. One knows that the introduction of GMR read heads in hard disks has led to a considerable increase of their information capacity. Other spintronic properties are exploited in the M-RAMs, nano-devices expected to improve soon the technology of the computers and reduce significantly their energy consumption.

Professor Fert is currently continuing his research in nanophysics. In the last decade, he was one of the pioneers of the research on the magnetic quasi-particles called skyrmions, a new field of spintronics that is very promising for Information and Communications Technologies. His today interest is also on the physics of topological matter. Science in the Basque Country has cause to celebrate, since in just a few months' time, the illustrious scientist due to join the University of the Basque (UPV/EHU) and DIPIC.

Career and awards

Albert Fert was born in Carcassonne (France). He first earned degrees in mathematics and physics from the École Normale Supérieure (Paris) and then, in 1970, received a PhD in physics from the Université Paris-Sud, where he was made a professor in 1976. He is currently an emeritus professor at that same institution. In 1995, he cofounded the Unité Mixte de Physique CNRS/Thales, a joint laboratory of the Centre National de la Recherche Scientifique (CNRS) and Thales Group, and has served as scientific director since the very beginning.

In addition to a Nobel Prize, Albert Fert has also received many other awards including the American Physical Society's International Prize for New Materials (1994) and the Wolf Prize in Physics (2006). He is a member of the French Academy of Sciences and is Doctor Honoris Causa at over a dozen universities throughout the world.



William FRIEDMAN

Botany

Harvard University, USA

Botanist slash collector

The botanist William Friedman is internationally renowned for his research into the evolutionary history of seed plants. He is currently the director of the Arnold Arboretum, Harvard University's botanic gardens, which houses a collection of over 15,000 plants.

The Arboretum is in itself a world-famous laboratory which attracts visiting scientists from all over the world. Moreover, its staff also travel to the far corners of the planet to collect and study plants in their natural habitats. The aim is to prepare for challenges of all kinds, from climate change to genomics.

Friedman's work focuses on the organic interrelationship between developmental biology, phylogenetics and evolution, together with the origin and subsequent diversification of flowering plants. He also has a keen interest in evolutionary history and continues to be fascinated by Charles Darwin's *On the Origin of Species*. He currently teaches a seminar at Harvard entitled 'Getting to Know Darwin', in which students recreate a number of Charles Darwin's experiments (discovering, for example, whether earthworms respond to piano and bassoon music) and read related writings and letters.

Career and awards

William (Ned) Friedman is an Arnold Professor at Harvard University's Department of Organismic and Evolutionary Biology, and is also the eighth director of the 144-year-old Arnold Arboretum at that same institution.

He graduated with High Honours in Biology from Oberlin College (1981) and earned a PhD in botanics from the University of California, Berkeley (1986).

Throughout his long and distinguished career, he has conducted research at the Universities of Arizona, Georgia and Colorado and has won a number of prizes and awards, including the National Science Foundation's Presidential Young Investigator Award (1991), the University of Georgia's Creative Research Medal (1993) and the Botanical Society of America's Pelton Award (2004). He is a Fellow of the Linnean Society (London) and the American Association for the Advancement of Science.



Serge HAROCHE

Physics

Collège de France, Francia

Nobel Laureate in Physics 2012

When quantum mechanics happen in a laboratory

A century ago, the German Max Planck won the Nobel Prize in physics for postulating energy quanta and opening the way to quantum mechanics. Serge Haroche obtained the Nobel Prize in 2012 for testing quantum mechanics in the reality of the laboratory. Haroche is a French physicist who has designed ingenious experiments to study quantum phenomena when matter and light interact. He has been able to capture photons using two mirrors as a trap where light particles bounce, that enable measuring and manipulation of individual quantum systems. Thanks to his contributions in this field, he obtained the Nobel Prize in 2012 together with David J. Wineland.

Haroche developed new methods for laser spectroscopy, based on the study of quantum beats and superradiance. He then moved on to Rydberg atoms, giant atomic states particularly sensitive to microwaves, which makes them well adapted for studying the interactions between light and matter. He showed that such atoms, coupled to a superconducting cavity containing a few photons, are well-suited to the testing of quantum decoherence and to the realisation of quantum logic operations necessary for the treatment of quantum information.

Career and awards

Serge Haroche was born in Casablanca, Morocco. Aged 12, he moved to France. He graduated from Ecole Normale Supérieure (ENS), receiving his doctorate from Paris VI University in 1971 under the supervision of Claude Cohen-Tannoudji (Nobel Prize in Physics in 1997). After a post-doctoral visit to Stanford University, he became full professor at Paris VI University in 1975, a position he held until 2001, when he was appointed Professor at Collège de France (in the chair of quantum physics). He has also been Maître de Conférence at Ecole Polytechnique (1974-1984), visiting professor at Harvard (1981), part time professor at Yale University (1984-1993), member of Institut Universitaire de France (1991-2000) and chairman of the ENS Department of Physics (1994-2000). In September 2012, he was appointed "Administrateur du Collège de France" (equivalent to President of this institution). Since 2015 he has been an emeritus professor at Collège de France.

In addition to the Nobel Prize, he has received several prizes and recognitions. In 1992 he received the Humboldt Prize, in 1993 the Albert A. Michelson Medal of the Franklin Institute, in 2007 he received the Charles Hard Townes Prize and in 2009 the CNRS Gold Medal. He is a member of the French Academy of sciences and of the European Academy of Sciences and a foreign member of the National Academy of Sciences of the United States. He is also a member of the Brazilian, Colombian, Moroccan and Russian Academies of Sciences.

Plenary Lectures



Dudley HERSCHBACH

Chemical Physics

Chemical Physics

Nobel Laureate in Chemistry 1986



Jean-Marie LEHN

Supramolecular Chemistry

Université de Strasbourg, France

Nobel Laureate in Chemistry 1987

A farmer boy at age of 11 who fell in love with science

Dudley Herschbach is a chemical physicist who undertook molecular beam experiments in 1959. At first, most chemists dismissed the prospect of “single-collision chemistry” as “a lunatic fringe.” Crossed beams proved to be an unequivocal way to confirm that a reaction is elementary and to study its dynamical properties. The research thrived, attracting graduate and postdoctoral students of exceptional ability and adventurous spirit. In 1986, Herschbach, together with his colleague Yuan T. Lee and the Canadian chemist John C. Polanyi, received the Nobel Prize in Chemistry.

Dudley is devoted to education and scientific culture and often gives talks to students of all ages, conveying his contagious enthusiasm for science and discovery.

Career and awards

Born in San Jose, California (1932), he grew up nearby in a rural farming area (pre-Silicon Valley!). He did not expect to go to university, much less become a professor or scientist and owes that accomplishment to inspiring teachers and generous scholarship awards. At Stanford University, he graduated in mathematics (1954) and obtained a Master's in chemistry (1955). At Harvard, he gained a Master's in physics (1956), and a Ph.D. in chemical physics (1958). He joined the chemistry faculty at the University of California at Berkeley, then returned to Harvard as a full professor (1963). After an intense, 40-year stint at Harvard, he became an emeritus professor (2003). Since then he has been a part-time professor at several places and pursued new research.

He is a Fellow of the American Academy of Arts and Sciences, the National Academy of Sciences, the American Philosophical Society and the Royal Chemical Society of Great Britain. As well as the Nobel Prize, he has received many other awards and accolades at both national and international levels, including: the National Medal of Science, the ACS Award in Pure Chemistry, the Linus Pauling Medal, the Irving Langmuir Award and the American Institute of Chemists Gold Medal.

The father of supramolecular chemistry

Born in France, in 1987 Jean Marie Lehn shared the Nobel Prize for Chemistry with Charles J. Pedersen and Donald J. Cram, for his studies on the chemical basis of ‘molecular recognition’ (i.e., the way in which molecules recognize and selectively bind to each other), 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, for which he has proposed the term ‘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. Subsequently, the area developed into the chemistry of “self-organization” processes and more recently towards ‘adaptive chemistry’, dynamic networks and complex systems.

Career and awards

Lehn studied chemistry at the University of Strasbourg, earning his PhD in 1963. He then spent a year in Robert Burns Woodward's laboratory at Harvard University, where he was part of the team working on the total synthesis of vitamin B12. He also took a course in quantum mechanics and began carrying out his first calculations with Roald Hoffmann. In 1964 he witnessed the first steps in what would later be known as the Woodward–Hoffmann rules.

In 1966 he became a lecturer at the University of Strasbourg and set up his own laboratory, where he focused his work on the physical chemistry of organic compounds, putting the experience gained in organic chemistry, quantum theory and physical methods into practice. In 1970 he was appointed Professor of Organic Chemistry at the Louis Pasteur University of Strasbourg and from 1979 to 2010 he was Professor at the Collège de France in Paris. He is presently Professor at the University of Strasbourg Institute for Advanced Study (USIAS). His later research combined the recognition, transport and catalytic properties of supramolecular species with their characteristics during their organised phase, with the aim of designing molecular devices that could, in the future, process signals and information at a molecular level.

Lehn is a member of many academies and scientific institutions and has won many international awards and prizes, including the Humboldt Prize (1983), the Royal Society's Davy Medal (1997) and the ISA Medal for Science (2006). He received the Order of Merit of the Federal Republic of Germany in 2009 and was named Grand Officer of the French Legion of Honour in 2014, among other accolades.

**María MARTINÓN-TORRES****Paleoanthropology**

CENIEH National Research Center of Human Evolution, Spain

**Ginés MORATA****Genetics**

Centro de Biología Molecular Severo Ochoa, Spain

Searching for the origins of our species

María Martínón-Torres is a Spanish physician and palaeoanthropologist. She has been a member of the Atapuerca Research Team since 1998 and the Director of the National Centre for Research into Human Evolution since 2017. She has participated in various international projects on dentition in hominids, including a study of the dental remains of the oldest hominid in Europe.

Her research focuses on the study of hominid palaeobiology, the evolution of dental apparatus with taxonomic and phylogenetic implications, evolutionary scenarios and palaeopathology. She has worked at Atapuerca and Dmanisi (Georgia), and has collaborated in various international research projects with French, Chinese, South African and British colleagues.

In Dmanisi, her team found the oldest human remains discovered outside Africa, dating from 1.8 million years ago, a finding that may prove that the first Europeans actually hailed from Asia, rather than the African continent.

Career and awards

Martinón studied Medicine and Surgery at the University of Santiago de Compostela, winning the Extraordinary Bachelor's Degree Prize, and earned her PhD from the same university, winning the Extraordinary Prize in Medicine and Surgery. Her doctoral thesis analysed the dentition of fossil hominids, and was co-directed by José María Bermúdez de Castro, co-director of the Sierra de Atapuerca archaeological sites, and Ángel Carracedo, director of the Institute of Legal Medicine in Santiago de Compostela.

Martinón specialised in Forensic Anthropology at the Autonomous University of Madrid and in Human Evolution at the University of Bristol. In 1998 she joined the Atapuerca research team and from 2007 to 2015 was head of research into Dental Anthropology in Hominids at the National Centre for Research into Human Evolution (CENIEH). Since 2015 she has lectured at the Department of Anthropology at University College London. On 11 December 2017, she was appointed Director of the National Centre for Research into Human Evolution (CENIEH). She teaches master classes on various Summer Course programmes.

She has published over ten books or book chapters in the field of human evolution, as well as over 90 papers in international scientific journals. She was included in the Top 1% most-cited authors in her field by Thomson Reuters. Since 2019 she has been a member by invitation of the Gadea por la Ciencia Foundation's Scientific Advisory Board. The Royal Anthropological Institute has decided to confer upon her its 2019 Rivers Memorial Medal in recognition of the excellence of her recent contribution to the anthropological field.

From fly to human

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 is a specialist in developmental genetics, a discipline in which he has worked for the past 50 years. His preferred animal model is the *Drosophila melanogaster* vinegar fly, an organism which has developed an extraordinarily powerful genetic technology which enables experiments that would be impossible to perform with any other species. Professor Morata's studies revealed the genetic architecture of the *Drosophila melanogaster*'s body, which was later found to be common to the entire Animal Kingdom, including humans. Professor Morata is credited with discovering the phenomenon known as 'cell competition', a process by which unwanted cells are eliminated in animal tissue. The process is also present in all metazoans and plays a key role in cancer suppression and tissue homeostasis.

Career and awards

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. Professor Morata recently became a Foreign Member of the Royal Society (2017) and a Foreign Associate of the US National Academy of Sciences (2018).

Plenary Lectures



Sir John PENDRY

Photonics

Imperial College London, UK



Christophe ROSSEL

Physics

IBM Research- Zurich, Switzerland

The designer of the invisibility cloak

The British physicist Sir John Pendry theoretically proposed a series of completely new metamaterials, or artificial materials (particularly those with a negative refraction index) that are not found in nature. The optical properties of these materials enable light to bend upon reaching an object, thereby forming a kind of container around it, rendering it invisible to microwaves. Pendry published his proposal in the scientific journal *Science* in 2006. He had effectively designed the first invisibility cloak.

The development of different metamaterials has also given rise to a number of prototypes for the 'perfect lens' whose resolution is not limited by wavelength. Unlike a normal lens, the perfect lens would enable a virus or other things that are smaller than light itself (molecules or even atoms) to be seen with the naked eye.

Career and awards

Born in England, Sir John Pendry has worked at the Blackett Laboratory, Imperial College London (United Kingdom), since 1981. He began his career at Cambridge University's Cavendish Laboratory, before becoming head of the theory group for six years at the Science and Engineering Research Council's Daresbury Laboratory (United Kingdom).

He was later appointed head of the Physics Department at Imperial College London, and Principal of the Faculty of Physical Sciences. He has won many awards and accolades throughout his career. He was made a Fellow of the Royal Society in 1984, and is an honorary fellow of Downing College, at the University of Cambridge. He has also been awarded the Dirac Prize (1996) and the Royal Medal of the Royal Society (2006) and was knighted for his services to science in 2004. More recently, he was elected a foreign associate of the US National Academy of Sciences. In 2013, the Institute of Physics awarded him the Isaac Newton Medal, and he won the Kavli Prize in Nanotechnology in 2014 and the ³Sand the Dan David Prize in 2016.

An experimental physicist for the electronics of the future

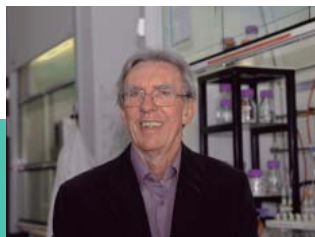
Christophe Rossel is an experimental physicist specialising in the study of advanced materials. He is particularly interested in describing the properties of semiconductor systems, which are the foundations of the electronic industry. A substantial part of his work in the company IBM has been focused on developing materials that may be integrated into state-of-the-art transistors, and he is also an expert in the different computing paradigms that researchers and companies are currently exploring for the future.

Career and awards

Christophe Rossel is a Swiss physicist. He studied at the University of Neuchâtel, graduating with a degree in physics in 1975. After teaching and research assistantship at Temple University in Philadelphia (USA), he moved to the University of Geneva where he earned a PhD in Condensed Matter Physics in 1981. He continued with his postdoctoral studies in this same city, and later pursued his academic career at the University of California San Diego (UCSD), where he became an associate research scientist and, later on, a lecturer. His work during his time in California (1983-1987) focused on superconductivity and strongly-correlated systems.

In 1987 he joined the IBM Research - Zurich Laboratory in Switzerland as a research staff member, heading up projects on high-temperature superconductors and later on semiconductors, with a specific focus on introducing new functional materials into high-performance electronic devices for logic and memory-related applications. Author of many scientific publications and patents, he has since retired from IBM Research - Zurich, although he remains affiliated to it as an emeritus research staff member.

Rossel has won several IBM Research Division prizes, including the Outstanding Technical Achievement Award. He is a Fellow of the Institute of Physics (United Kingdom, IOP FInstP) and of the European Physical Society (EPS). He was also an active member of the steering committee of the International Year of Physics in 2005. Due to his extensive experience in scientific societies and scientific affairs at both a national and international level, he was appointed President of both the Swiss Physical Society (2008-2012) and the European Physical Society (2015-2017). Since 2016 he has been a member of the High-Level Advisory Group 'Open Science Policy Platform' (OSPP) established by the Directorate-General for Research and Innovation of the European Commission in Brussels. In 2018 he became a member of the Executive Board of the Swiss Academy of Sciences, with a focus on the MAP (mathematics, astronomy and physics) Platform.



Jean-Pierre SAUVAGE

Chemistry

University of Strasbourg, France

Nobel Laureate in Chemistry 2016

Creator of molecular machines: nanorobots

Jean Pierre Sauvage is a French chemist best-known for his work in the field of nanotechnology, in which he discovered how to trigger and control molecular movement. Professor Sauvage's team designed the first ever molecular muscle and created, along with a team of experimental researchers, an eight-nanometre-long object that tenses and relaxes upon receipt of an external signal, and which can be used, for example, as an articulated minirobot. Alongside J. Fraser Stoddart and Ben L. Feringa, he won the Nobel Prize in Chemistry in 2016 for his design and synthesis of molecular machines.

Prior to his groundbreaking research, it was believed that artificial molecules could only be static. His work demonstrated that they had the potential to become dynamic systems with great capacity for movement. The concept is highly innovative (molecules that can behave like information transfer motors) and the possibilities are endless. In medicine, for example, these minirobots or nanorobots could be injected into the bloodstream to attack malignant cells.

Career and awards

Jean-Pierre Sauvage was born in Paris (France) and earned his PhD from the Université Louis-Pasteur in Strasbourg in 1971, under the supervision of the researcher Jean Marie Lehn, who would later win a Nobel Prize in Chemistry in 1987. He has worked at the French National Scientific Research Centre (CNRS), serving first as Director of Research from 1979 to 2009. He has also been a Professor at the University of Strasbourg and nowadays he is Professor Emeritus.

He was elected a member of the French Academy of Sciences on 24 November 1997. He is a Knight of the French Legion of Honour and a Centenary Lecturer and Medal at the Royal Society of Chemistry (United Kingdom). He was awarded the Pierre Sue Prize by the French Society of Chemistry and the Blaise Pascal Medal in Chemistry in 2012, by the European Academy of Sciences. He was elected a foreign associate of the US National Academy of Sciences in April 2019.



Maria VALLET-REGÍ

Smart Biomaterials

Universidad Complutense de Madrid (UCM)CIBER-BBN, Spain

Pioneer in smart biomaterials for bone regeneration

Maria Vallet is a researcher working in the field of mesoporous ceramic materials for use in biomedicine and the person who discovered a series of potential biomedical applications for said materials, particularly in the field of bone regeneration and controlled drug release systems. In 2018 she received the Rey Jaime I Basic Research Prize for her pioneering contributions to her chosen field.

The Research into Smart Biomaterials Group (GIBI), CIBER-BNN, which she heads up at the Complutense University of Madrid, is currently developing different strategies for curing bone-related ailments such as cancer, osteoporosis and implant infections. In the case of cancer, they use silica nanoparticles to transport drugs inside the body to affected areas and to release them in a controlled manner. When cancer cells are detected, the nanoparticles are activated through external stimuli (ultrasound, for example), thereby releasing the drug on site. These selective methods enable physicians to treat patients without harming the healthy cells located in the vicinity of the tumour. Similarly, nanoparticles can also transport antibiotics to cure infections, and tailor-made 3D-printed implants can be created as hosts for the cultivation of stem cells capable of regenerating bone tissue.

Career and awards

Born in Las Palmas de Gran Canaria, in the Canary Islands, María Vallet-Regí studied chemistry at the Complutense University in Madrid, earning her PhD at the same institution in 1974. She is currently Emeritus Professor of Inorganic Chemistry and Director of the GIBI research group at the Department of Inorganic Chemistry and Bioinorganics at the Complutense University of Madrid's Faculty of Pharmacy.

She has written over 700 scientific papers and has 13 patents and over 38,000 citations. According to the ISI Web of Knowledge, she was the most-cited Spanish scientist in the field of Materials Science in the last two decades.

She is a full professor at the Complutense University and a numbered fellow of the Royal Academy of Engineering (RAI) and the Royal National Academy of Pharmacy (RANF). She is also a Fellow of Biomaterials Science and Engineering at the International College of Fellows of Biomaterials Science and Engineering (ICF-BSE) and a Fellow of the American Institute for Medical and Biological Engineering (AIMBE).

She has won many national and international prizes, including the National Research Prize in 2008, the Jaume I Prize for Basic Research in 2018, the Société Française de Chimie's Prix Franco-Espagnol 2000, the RSEQ 2008 Prize in Inorganic Chemistry, the FEIQUE Research Prize in 2011, the RSEQ Gold Medal in 2011, the IUPAC 2013 Distinguished Women in Chemistry/Chemical Engineering, the Miguel Catalán Research Prize in 2013, the Lilly Distinguished Career Award in Chemistry in 2016 and the Julio Peláez Prize for Pioneering Women in Physics, Chemistry and Mathematics, awarded by the Tatiana Pérez de Guzmán el Bueno Foundation in 2017. She also has a Gold Medal for Merit in Research and University Education and is Doctor Honoris Causa at the Jaume I University and the University of the Basque Country.

Invited Speakers

Bertso Passion



Amets ARZALLUS

Versifier, Basque Country

Born in Hendaye, he began to practice Basque improvised sung poetry at a very young age influenced by the atmosphere at his home. After attending Seaska School and Bayonne College, he studied journalism at the University of the Basque Country (UPV/EHU). He regularly writes for the weekly publication *Argia* and the daily newspaper *Berria*, and often collaborates with *Euskadi Irratia* (a local radio station which broadcasts exclusively in the Basque language). He has participated in numerous events and activities including talks, critical reflections in public and preparation and transmission of messages for public events. He has also taught Basque improvised verse singing at the Bertso Eskola in Hendaye, has won numerous written verse competitions, has written lyrics to many songs and has participated in many projects designed to merge the world of Basque improvised verse singing with other disciplines such as dance, poetry and music, for example. He has won the Bertsolari Championship of Navarre four times, and the Xilaba Bertsolari Xapelketa Competition three times. He came second in the Basque Country's Bertsolari Championship in 2009 and won in 2013.



Andoni EGAÑA

Versifier, Basque Country

Born on October 2nd in 1961 in Zarautz (Gipuzkoa). He currently lives in his home town, although he did spend a number of years in Vitoria-Gasteiz, the capital of both the province of Alava and the Autonomous Region of the Basque Country. He has a degree in Basque Philology. Nowadays, he is fully dedicated to creation works: not only he is well-known for being a Basque improvised verse singer (a bertsolari as they are known in the Basque language), but also for his writings and his television scripts. He has experimented with various different literary genres and has collaborated and collaborates often with the Basque press, writing opinion articles. He has brought out an album featuring a collection of his own verses and has written songs for other singers too. From the end of the 1980s onwards, and particularly during the 1990s, he has been one of the most respected and recognised names in the world of Basque improvised sung poetry. Andoni Egaña stands out as well for his work as a researcher, scholar and theoretician, and has made seminal contributions to the analysis and dissemination of the creative process involved in Basque improvised poetry. He has participated in numerous experiences seeking to bring together the world of improvised verse singing and other forms of expression such as dance, accordion (or trikiti) playing, poetry and music, etc. He has been a Board member of the Association of Friends of Bertsolaritza for many years and was formerly head of its Research Department. He won the Bertsolari Championship of the Basque Country four times, in 1993, 1997, 2001 and 2005.



Maialen LUJANBIO

Versifier, Basque Country

Maialen Lujanbio has a degree in Fine Arts, and her passion, the art of Basque improvised verse singing, is now her profession. She began practising bertsolaritza, as the art is known in the Basque language, at the Bertso Eskola (improvised Basque verse school) and made her debut in the inter-school contests.

In 2003 she won the Gipuzkoa Bertsolari Championship, in 2001, 2005 and 2013 came second in the Basque Country's Bertsolari Championship and became champion in 2009 and 2017. In addition to Basque improvised verses she has also embarked on a number of other creative projects. From 2006 to 2011 she worked with Judith Montero and Xabier Erkizia to implement a project called *Ornitorrinkus*, an initiative which merges experimental music, sound and words and which gave rise to the book-album "*Ornitorrinkus*". In 2011 she created the radioperformance "*Txori Mugariak*" with Xabier Erkizia, and in 2013 worked on the project "*Hegi, Egia, Egiak*". She regularly collaborates with *Euskadi Irratia* (a local radio station which broadcasts exclusively in the Basque language) and gives talks in many towns, as well as at the University of the Basque Country (UPV/EHU), about the use of Basque in the workplace. She has collaborated with the weekly publication *Argia* and the daily newspapers *Egunkaria* and *Berria*, among others. Maialen Lujanbio lives in close contact with words, and in particular, with the world of bertsolaritza.



Iñaki MURUA

Versifier, Basque Country

Iñaki Murua Jauregi was born in Gabiria (Gipuzkoa) on 30 July 1956 in the Agerre Etxemendi farmhouse. When he started school at age five, the only language he spoke was Basque, and the only language the only teacher at the National Primary School in his village spoke was Spanish. He completed a vocational training course to become qualified as a Specialist Industrial Electrician and from the age of 25 taught Basque and philosophy to high school students until his retirement. He publishes opinion articles in different Basque media outlets and regularly makes radio appearances. Thanks to his ironic, humorous style, he is also a popular presenter and master of ceremonies at Basque extempore verse making festivals. He won the Xenpelar prize for young bertsolaris and was a finalist at the Basque Country Bertsolari Championship in 1986 and 1989. He is a member of the Friends of Bertsolaritza Association, serving as Chairman for the past 13 years.

Passion Txiki

Ana GALARRAGA

Elhuyar Fundazioa, Basque Country

Ana Galarraga Aiestaran is a scientific educator at Elhuyar. A graduate in veterinary science and food science and technology, she started working at Elhuyar in 2001 as a writer. She has published hundreds of reports and interviews in Elhuyar's trimonthly science magazine and has edited the young people's science magazine Irrika. A regular contributor to numerous media (press, radio and television), she plays a part in organising, coordinating and presenting different live activities and projects.

She is the author of the Marikalanbre stories in Irriak magazine, published by the Irrien Lagunak project. She has also published a book with a selection of stories about the character and information sheets on the experiments: "Marikalanbre bizitzaren laborategian". Taking science as the basis, in her stories she mixes curious, fun happenings with scientific experiments, with three main aims: to arouse curiosity, to show the fun side of science and to develop values such as equality, respect, effort and accepting mistakes, friendship, teamwork and so on.

Naukas Passion

Xurxo MARIÑO

Universidade da Coruña

Xurxo Mariño has a PhD in Biology from the University of Santiago de Compostela, and currently lectures in the Department of Medicine at the University of A Coruña. He is a member of the Neurocom research group at that same university, has published research papers in a number of specialised journals and has collaborated with the Massachusetts Institute of Technology (MIT). He often participates in science dissemination activities, striving to foster greater interaction with the rest of humanities. He is the author of several books, including: "Os dados do reloxeiro", "Po de estrelas" and "Neurociencia para Julia"; and contributes to the online platform Naukas. He organises "scientific cafétheatre events" and engages in other dissemination activities such as "Discurshows", a hybrid format which is part talk and part performance. In 2011 he was awarded the Special Jury Prize at the "1st FECYT Competition of Scientific Communication", and in 2014 won the Tesla Award for Dissemination. In 2017 he was awarded the Lois Peña Novo prize. In 2018 he received the award in the Dissemination category at the Gala do Libro Galego for his book "Tierra" ("Earth"), a work that also received an honourable mention in the Prismas 2018 awards.

Oswaldo DIGÓN

Actor

Theatre studies at the Casa Hamlet academy in 2005, theatre improvisation with ImproMadrid in 2010 and interpretation with the audiovisual production company La Tuerka 27 in 2016. Theatre actor for professional companies Espello Cóncavo, Teatro da Bufarda and Valacar. The latter won the Max theatre award in 2013 for the accompanying work in the world of theatre. Comedian in the cast of the show "Las noches del club de la comedia" in the Rialto Theatre (Madrid) and Condal Theatre (Barcelona). Script and performance of the comedy monologues "Diálogos en 3D" (running for four seasons in the Villarreal Theatre, Barcelona) and "Gente triste" (two seasons in the Muñoz Seca Theatre, Madrid). Actor in the TVG programme "Malo será!" since. Screenwriter of the TVG programmes: "A casa da conexa", "Tourilandia" and "Malo será!". Actor and director of the theatre improvisation company "Los duguís impro" in 2013.

Ikerbasque Awards

Maia GARCIA VERGNIORY

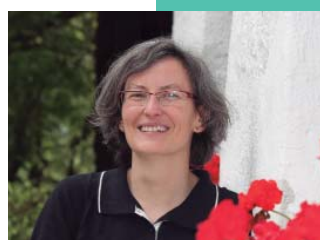
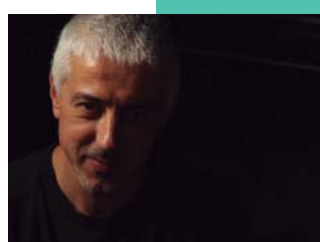
Ikerbasque researcher at DIPC

She received her Ph.D. in Physics from condensed matter at the UPV/EHU. Later she worked at the Max Planck Institute of Microstructure Physics and made a postdoctoral stay at the Lawrence Berkeley National Laboratory in the United States. Currently, she develops her research on topological materials in the DIPC as Ikerbasque Researcher. In 2017 she won the L'Oréal- Unesco prize for Women in Science, and in 2018 she was part of the QUO 2018 science selection. In 2019, has received the Ikerbasque award for her outstanding contribution to the field of topological materials.

Aitziber LÓPEZ-CORTAJARENA

Ikerbasque researcher in CIC biomaGUNE

After a Ph.D. in Biochemistry from the UPV/EHU, she moved to Yale University, where she worked for seven years on the design, structure and function of proteins. In 2011 she decided to return to Europe, and established her research group at IMDEA-Nanoscience, Madrid, to work on the design of proteins aimed at the generation of biofunctional nanostructures. In 2016, she joined CIC biomaGUNE as Ikerbasque Research Professor to lead the Biomolecular Nanotechnology group, for which she has one of the most prestigious research grants: an ERC-Consolidator Grant. In 2019, she received the Ikerbasque award in recognition for her leadership in the field of protein engineering.



Committee



Pedro Miguel ECHENIQUE

Chairman of P4K 2019

President of DIPC and
Professor at the University of the Basque
Country (UPV/EHU)

Professor of Condensed Matter Physics at the University of the Basque Country (UPV/EHU), President of Donostia International Physics Center (DIPC) and of the Materials Physics Center (MPC), President of the Social Council of San Sebastian City Council and Deputy President of the Euskampus Fundazioa, the foundation of the UPV/EHU International Campus of Excellence. He is also Honorary President of Jakiunde, the Basque Academy of Sciences, Arts and Letters, member of the Royal Academy of Sciences and the Académie Royale de Belgique, and honorary member of the European Physical Society.

He has received numerous awards and distinctions, including the Euskadi Prize of Research (1996), the Prince of Asturias Award for Scientific and Technical Research (1998), the Max Planck Physics Prize (1998), the Blas Cabrera National Research Prize (2005) and the Gold Medal of the City of San Sebastian (2000), among others. He is also Doctor in Science from the University of Cambridge (1998) and has been named Doctor Honoris Causa by another five universities.

In addition his work as a researcher, with over 400 papers published in specialised journals and over 200 invited talks given at international conferences and prestigious universities and institutions all over the world, over recent years he has dedicated much effort to promoting science as a cultural activity and to highlighting the importance of a scientifically well-informed society.



Ricardo Díez MUIÑO

Chairman of P4K 2019

Scientific CSIC researcher at the Materials
Physics Center CFM (CSIC-UPV/EHU) and
Director of DIPC

Ricardo Díez Muiño has been the Director of Donostia International Physics Center (DIPC) since 2013. He is also a CSIC scientific researcher at the Materials Physics Center (CFM), a joint initiative between the Spanish National Research Council (CSIC) and the University of the Basque Country (UPV/EHU), of which he was Deputy Director between 2005 and 2011 and Director between 2011 and 2015.

He graduated with a degree in Physical Sciences from the Autonomous University of Madrid in 1991 and with a PhD in Physical Sciences from the University of the Basque Country (UPV/EHU) in 1996. He has worked at the University of Bordeaux and at the Lawrence Berkeley National Laboratory in California.

His main field of specialisation is the theoretical physics of condensed matter and in particular electronic dynamics in solids, surfaces and nanostructures. He has published more than 100 scientific articles, including contributions in journals such as Science, Nature and Physical Review Letters, in addition to being co-author of one book and co-editor of another.

Executive Committee:

Javier ARMENTIA

Pamplona Coordinator

Director of the Pamplona Planetarium

Amaia ARREGI

General Coordinator of P4K 2019

Scientific Communication and Dissemination at DIPC

Rosa ERRAZKIN

Bergara Coordinator

Technician at the Laboratorium Museum

Paola FERRARIO

PhD training

Ikerbasque researcher at DIPC

Nora GONZALEZ

Plenary Lectures

Head of Scientific Communication and Dissemination at DIPC

Xabier LÓPEZ

Dynapeutics International Summer School

Lecturer and researcher at the University of the Basque Country UPV/EHU

Idoia MUGICA

Encounters and Passion Txiki

Head of Communication at CFM (CSIC-UPV/EHU)

Itziar OTEGUI

Encounters and Passion Txiki

Head of Communication CIC nanoGUNE

Juan Ignacio PÉREZ

Plenary Lectures

Coordinator of the Chair of Scientific Culture

Eider SAN SEBASTIÁN

Dynapeutics International Summer School

Lecturer and researcher at the University of the Basque Country UPV/EHU

Gustavo Ariel SCHWARTZ

Creativium Exhibition

CSIC researcher at the Materials Physics Center CFM (CSIC-UPV/EHU)

Manex URRUZOLA

Press Office P4K 2019

Head of the Elhuyar Communication Unit

Lankor

P4K 2019 Technical Secretariat

Passion for Knowledge is organised by Donostia International Physics Center (DIPC).



Donostia International Physics Center (DIPC) is a research centre located in Donostia-San Sebastian which pursues the generation of cutting-edge knowledge in physics and related disciplines. Its research areas, traditionally focused on condensed matter physics and materials science, have gradually diversified over the years to include other fields such as cosmology, quantum technology, particle physics and neurophysics.

DIPC also feels a responsibility to share scientific knowledge with the general public, as a means of contributing to economic and social progress. As well as a utilitarian instrument, science is also a tool for freedom. A scientifically-trained and well-informed society is better able to make the complex decisions required by our rapidly changing world. Scientific practice fosters critical thinking and dialogue, nurtures the rational exchange of ideas and promotes respect for perspectives and opinions that may differ from our own.

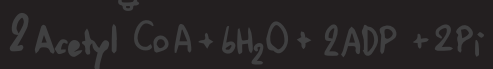
Science is also a key part of human culture. The generation of knowledge through science has radically changed the way we view the world and has had a profound effect on the human condition. Scientific progress forces us to think and rethink who we are and how we see the world in which we live. Science permeates other creative areas of humanity and is enriched by its contact with them. This is why we at DIPC believe that the dissemination of science cannot be separated from other branches of knowledge, and we therefore work to build bridges between our research and other activities and disciplines.

Passion for Knowledge festival is the flagship of the intense work carried out by DIPC in the area of scientific communication.

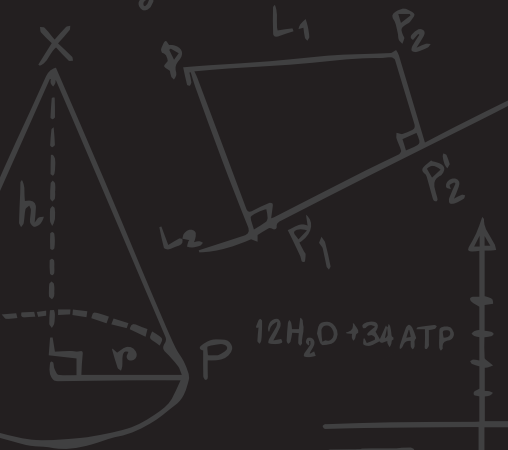
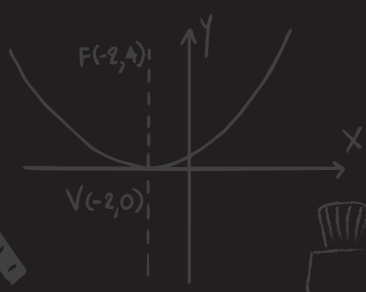
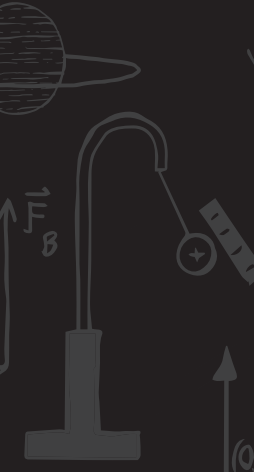
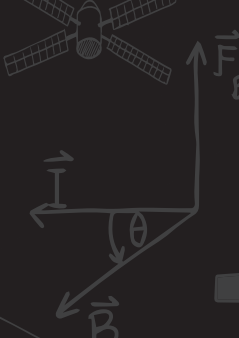
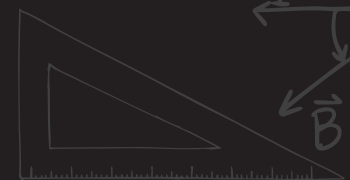
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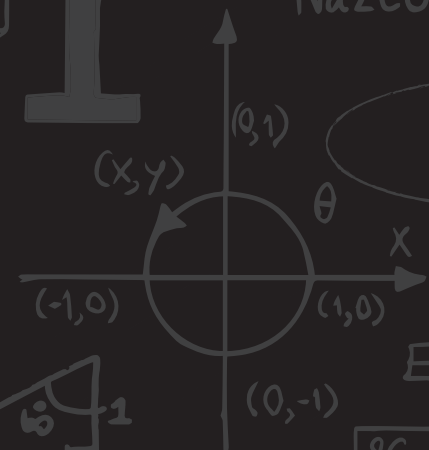
$$\frac{A}{2} = \pm \sqrt{\frac{1 + \cos A}{2}}$$



$$m = \frac{\log m}{\log n}$$

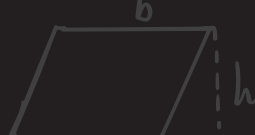
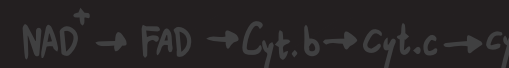
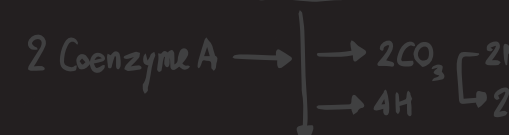
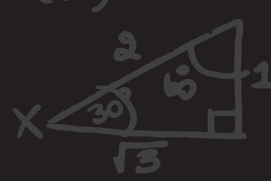
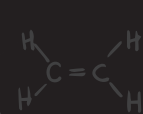
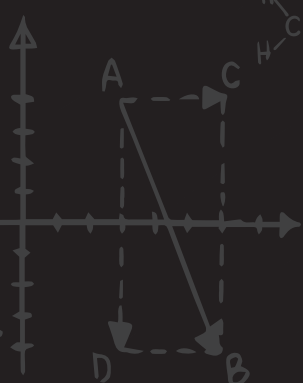


$$\frac{P(x)}{Q(x)} = \frac{G(x)}{Q(x)} + \frac{R(x)}{Q(x)}$$

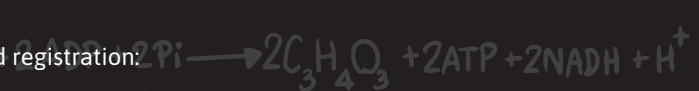
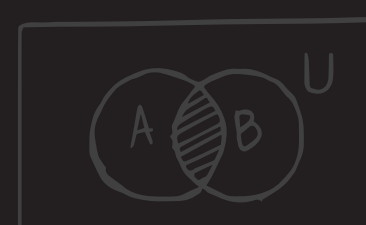
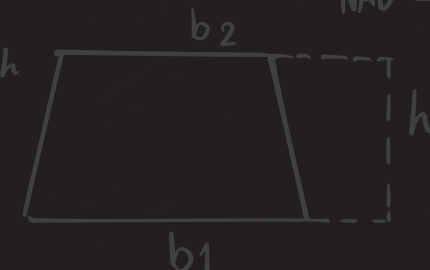


$$E = - \frac{\Delta \phi}{\Delta t}$$

$$\frac{A}{2} = \sqrt{\frac{1 - \cos A}{2}}$$



Parallelogram = bh



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PASSION FOR KNOWLEDGE 2019 FESTIVAL, DIPC

