The BIG Bell Test

A set of worldwide quantum physics experiments powered by human randomness

- ***For the first time, human unpredictability will play a key element in quantum physics experiments.***
- ***Several never-before-attempted experiments will run simultaneously on November 30th.***
- ***Coordinated by ICFO, the project needs the contribution of at least 30.000 people, so everyone in the world is invited to participate***

Barcelona, October 3rd, 2016

Would you like to know how your human unpredictability can help advance science? This is your chance! On November 30th 2016, you'll have the opportunity to participate in a unique worldwide project that will use **human randomness** to power experiments that test the laws of quantum physics.

Coordinated by ICFO - The Institute of Photonic Sciences, the BIG Bell Test is a worldwide project that intends to carry out a set of simultaneous **quantum physics experiments** in different labs **around the world** on November 30th**. The experiments need** the participation of a large number of **people,** who will contribute to the initiative by behaving as **randomly** as possible.

How the idea was born

This initiative was born from ICFO's contributions to the loophole-free Bell tests of 2015, which required an extraordinary attention to the nature of randomness and its role in physics experiments. ICFO contributed to these experiments by using a physical random number generator that produced very fast, very pure random numbers. Those experiments inspired the idea of a large-scale human-driven experiment using internet technologies. As Prof. Morgan Mitchell explains, *"There are deep mysteries of physics that can only be studied by asking unpredictable questions of Nature. The idea is, roughly, that if Nature knows what we will ask, she might trick us with a prepared response. Normally scientists are not so paranoid, but some of the predictions of quantum physics are so strange - tiny particles whispering to each other over enormous distances, objects that behave differently when we are not looking - that paranoia is completely appropriate, even necessary. In this context, humans making independent choices are very valuable, a unique way to ask unpredictable questions - no matter what secrets Nature might be hiding from us."*

The BIG Day

On November 30th, there will be nine experiments running, carried out by nine scientific partners: **CQC2T -- Griffith University** and **EQuS -- University of Queensland** (Brisbane-Australia), **CEFOP/Department of Electrical Engineering of the Universidad de Concepción** (Concepción-Chile), which node includes the **Department of Electrical Engineering** - **Linköping University**, the **University of Sevilla** and the **Dipartimento di Fisica—Sapienza Università di Roma**, **CAS --University of Science and Technology of China** (Hefei-China), **ICFO** (Barcelona), **IQOQI/OEAW** (Vienna-Austria), **LMU-Ludwig-Maximilian University** (Munich), **LPMC -- Université Nice/CNRS** (Nice-France), **QUDEV-ETH Zurich** (Zurich). The experiments will test, among many other things, the properties of entangled particles.

Carlos Abellán, Ph.D. student at ICFO, instigator of the project, designer of the platform that will direct data to each lab, finds that "*the most fascinating thing about the BIG Bell test is that people and scientists play an equally important role for the success of the experiment. It's a unique opportunity for bringing frontier research in quantum physics closer to people*."

In order to consider it a success, the project needs the contribution of at least **30.000 people,** on November 30th. On that day participants around the world will be asked to contribute through a video game, tailored specifically for this project that can be found on the **www.thebigbelltest.org** website (The BIG Bell Quest). Everyone who joins the initiative will be challenged to create a sequence of 0s and 1s as unpredictable or random as possible. These bits will be sent live to the quantum physics experiments, where they will determine the "questions asked" (i.e., the measurements made) of quantum objects including atoms, photons, and superconductors.

The BIG Bell Test's ultimate goal is to show for the first time that human choices can contribute to fundamental science, and at the same time, to perform a suite of never-before-attempted experiments. We invite you to contribute to science by joining the Bellster Community and showing us how unpredictable you are with video game. Start practicing now for Nov. 30th, the BIG day.

Follow us at @TheBellsters!

BBT Dossier: https://cloud.icfo.es/owncloud/index.php/s/sEYFFVgVUfAJ2MF
Promotional video of the BIG Bell Test (English): https://vimeo.com/184480786
Promotional video of the BIG Bell Test (Spanish sub): https://vimeo.com/185292940
Promotional video of the BIG Bell Test (Catalan sub): https://vimeo.com/185292887
The BIG Bell Test website: www.thebigbelltest.org
Outreach at ICFO: www.outreach.icfo.eu

About the ICFO Bellster Team

ICFO's team includes not only theoretical and experimental researchers but also staff from the Knowledge and Technology Transfer Unit as well as the Corporate Communications unit working together to make this initiative possible. The scientific team includes ICREA Prof. at ICFO Morgan Mitchell, Carlos Abellán, ICREA at ICFO Prof. Valerio Pruneri, ICREA at ICFO Prof. Antonio Acín, Dr. Jordi Tura. ICREA Prof. at ICFO Hugues de Riedmatten, Dr. Georg Heinze, and Pau Farrera will be performing the Bell Test experiment at ICFO.
The Outreach and Communications unit includes Dr. Marta García Matos, Dr. Federica Beduini, Maria Martí, Dr. Silvia Carrasco, and Dr. Alina Hirschmann.

About ICFO

ICFO - The Institute of Photonic Sciences, member of The Barcelona Institute of Science and Technology, is a research center located in a specially designed, 14.000 m2-building situated in the Mediterranean Technology Park in the metropolitan area of Barcelona. It currently hosts 350 people, including re-search group leaders, post-doctoral researchers, PhD students, research engineers, and staff. ICFOnians are organized in 23 research groups working in 60 state-of-the-art research laboratories, equipped with the latest experimental facilities and supported by a range of cutting-edge facilities for nanofabrication, characterization, imaging and engineering.

The Severo Ochoa distinction awarded by the Ministry of Science and Innovation, as well as 13 ICREA Professorships, 18 European Research Council grants and 6 Fundació Cellex Barcelona Nest Fellow-ships, demonstrate the centre's dedication to research excellence, as does the institute's consistent appearance in top worldwide positions in international rankings. From an industrial standpoint, ICFO participates actively in the European Technological Platform Photonics21 and is also very proactive in fostering entrepreneurial activities and spin-off creation. The center participates in incubator activities and seeks to attract venture capital investment. ICFO hosts an active Corporate Liaison Program that aims at creating collaborations and links between industry and ICFO researchers. To date, ICFO has created 5 successful start-up companies.

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