

Public Awareness of Research Infrastructure (PARI) III

Conference 8 - 10 April 2019 @STFC ISIS, UK



ERF-AISBL
Association of European-level
Research Infrastructure Facilities

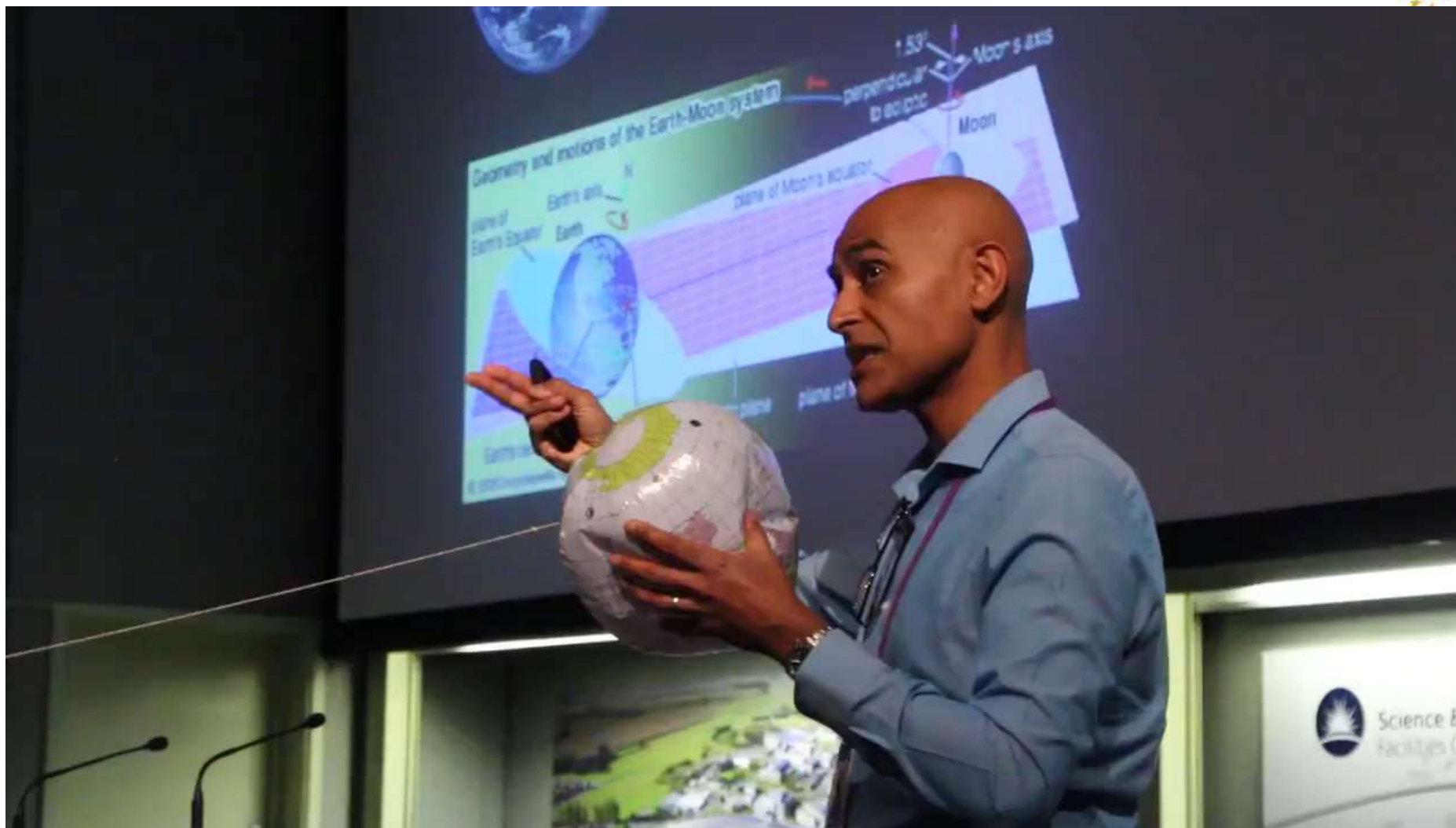


FRM II
Forschungs-Neutronenquelle
Heinz Maier-Leibnitz



Themes:

- Building and maintaining public trust
- Combatting fake news
- Measuring success
- Communicating communications
- Finding the next science superstar / mobilising staff
- Unconventional Outreach: STEM on the Road
- Unconventional Outreach: STEM and Art
- Communicating distributed infrastructures
- Equality and diversity communications





Toulouse hosts ESOF and becomes European City of Science 2018!

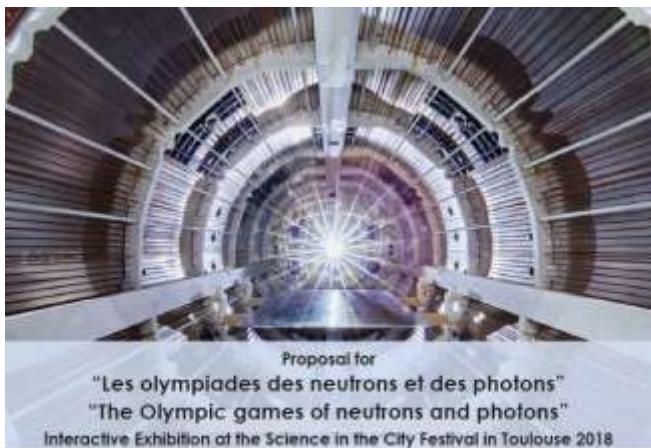
The 8th edition of ESOF took place in Toulouse, France, from 9 till 14 July 2018.

Science in the City Festival

7 - 15 July 2018

Parallel to the EuroScience Open Forum, the Science in the City Festival invested the city and its surroundings. As a free event, Science in the City Festival is aimed at people of all ages who are curious about science and innovation. It offered 150 events – free to the public.

Common proposal of the RICE working group in September 2017



Proposal for
"Les olympiades des neutrons et des photons"
"The Olympic games of neutrons and photons"
 Interactive Exhibition of the Science in the City Festival in Toulouse 2018

Interactive activities from 11 cutting-edge research facilities exploring the frontiers of physics on Earth and space.

Science is increasingly a global endeavour. To work at the cutting edge takes machines that can only be financed at the national and international level. Across Europe and beyond, particle accelerators, telescopes, neutron sources, synchrotron radiation facilities and research laboratories allow an international community of scientists to access tools no single university (or in some cases country) could provide.

Whether here on Earth in underground laboratories, or observing Nature's own laboratory in space, scientists explore extreme physics to better understand our environment. Physics is exciting, enlightening, complex, fundamental, precise, logical, and creative - all at the same time. However, for the public to get in touch with it and understand why it encompasses all these concepts simultaneously, efforts need to be made to bridge science and society. With this aim, communication teams at research infrastructures across Europe have teamed up in the RICE working group (Research Infrastructures Communications and Engagement) within the Association of European-level Research Infrastructure Facilities, (ERF-AISBL), to develop common outreach projects and workshops.

Using a range of interactive tools, we aim to enrich the Science and the City Festival in Toulouse with fun insights into physicists' research to better understand the world around and above us. With games, a little olympiade, exhibits, and astonishing virtual reality tours, live link-ups to the different facilities in 18 European countries and beyond culminating in a physics show, we want to ensure that visitors have the opportunity to experience out-of-this-world as well as world-class physics.



Hands-on activities

Neutron toss ball game



Children and adults can throw neutrons (yellow balls) at atoms (blue and white balls) of a crystal, thus experiencing how neutrons scattering works. The more atoms have been hit, the more rewarding results (gummy bears) they get.

Model of an ion accelerator



What is the principle behind particle accelerators? The model of an ion accelerator from the CEREC facility, Ruder Boskovic Institute, will allow visitors themselves the experience of...getting charged!

Computer game on i-pads



Operation Tokamak is a computer game enabling users to experience how a fusion reactor has to be handled in order to yield energy. Visitors can configure and steer their own fusion reactors using i-pads.

Vacuum - Art of the Void



With a vacuum chamber, experiments will be performed using balloons, bells and marshmallows in vacuum.

IDEA



The modular and transparent model of Delta IDEA (Interactive Display of Electron and Atom) is an interactive visualization of scientific data, based on the multidimensional project by computational materials physicist and computer Major Romanyuk-Pavlenko, Distinguished Research Professor at the University of North Texas and Distinguished Resident Artist 2017. The penetration of information through scientific means, not only provides a useful alternative and complement to visual data representation, but provides also the raw data for potential artistic reuses and further musical interpretation.

The Wooden Atomic Egg



Walking into a wooden reproduction of the famous Atomic Egg, visitors will travel to various from the remote, guided by the voices and explanations from scientists.

Photo exhibit



A photographic scenario will allow to travel to the laboratories of research infrastructures all over Europe and beyond. Visitors will get closer to the world of physics, through an interactive visual path.

Dance movie

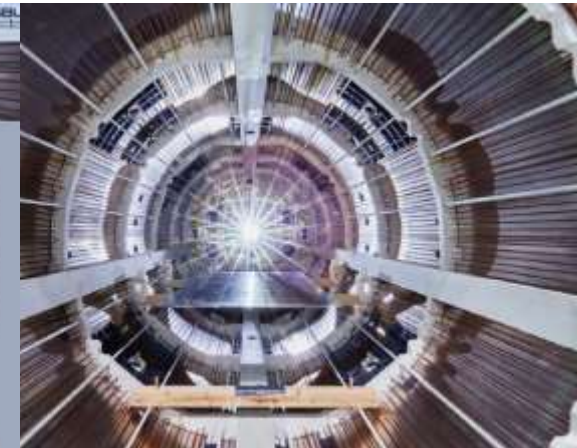


MAX IV - IT is a dance movie created at a synchrotron where the circular architecture and movement of electrons worked as inspiration for the choreographer and the dancers.

Crime comedy



Visitors can also watch what happens in a Swedish crime-comedy series where a scientist comes up with an idea too good to be true, or when two young archaeologists dig where they are not supposed to.



"Les olympiades des neutrons et des photons"
 Interactive Exhibition of the Science in the City Festival in Toulouse 2018



- The planning

Organization	Country
 European Spallation Source	Sweden, Denmark
 Diamond Light Source	United Kingdom
 Isis Neutron Source	United Kingdom
 Square Kilometre Array Telescope	United Kingdom
 MAX IV Laboratory	Sweden
 Helmholtz-Zentrum Berlin	Germany
 CERIC-ERIC	Austria, Croatia, Czech Republic, Hungary, Italy, Poland, Romania, Slovenia
 EUROfusion: European Consortium for the Development of Fusion Energy	Europe
 Forschungs-Neutronenquelle Heinz Maier-Leibnitz (FRM II)	Germany
 Elettra Sincrotrone Trieste	Italy
 Synchrotron SOLEIL	France
 SINE2020	Czech Republic, Denmark, France, Germany, Hungary, Italy, Portugal, Spain, Sweden, Switzerland, The Netherlands, UK

- The planning

From 250 m² confirmed beginning of May 2018

down to

50 m² end of May 2018



- The action



Implementation of “The Olympic games of neutrons and photons”:

- Scientific topics to chose:

1. ENERGY
2. ASTRONOMY
3. CULTURAL HERITAGE
4. ENVIRONMENT
5. HEALTH
6. MATERIAL ENGINEERING

- Provided equipment for visitors:

- Postcard
- Lanyard with gold medal
- Certification “Olympic scientist”
- Photo booth

- Game structure:

- Visitors chose a scientific topic (problem to solve).
- Visitors will be guided to the different stations.
- Roll-ups with explanations of the activities will be provided at each station (related to facilities and/or to scientific topics of **the “path” (more than one path can pass through an activity)**).
- At each station, a stamp will be collected on the postcard.
- A set of Success Stories divided under the different scientific topics will welcome the visitor after completion of the path.
- By showing the fully stamped postcard, the visitor will receive his **“gold medal” and “scientist certification”**.
- As a memory, take a picture at our Photo booth.

„The Olympic games of neutrons and photons“

Key facts:

- Participation RICE WG: 10 – 15 July 2018
- Participants ONSITE: 8
- Event space: 50 m²
- Common activities and individual activities

Designs:

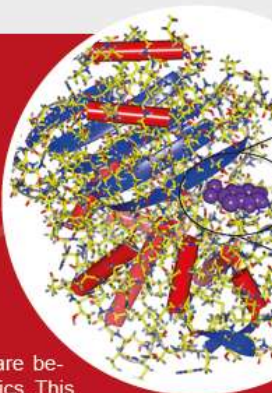


Success stories in English and French

HEALTH

How can we win the fight against bacterial infections?

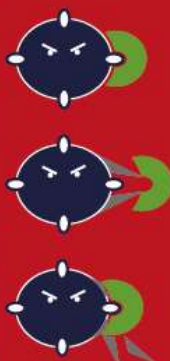
S. J. Tomanicek et al.,
J. Biol. Chem., 288, 4715 (2013)



More and more bacteria are becoming resistant to antibiotics. This makes it hard to treat diseases and increases dramatically the mortality rate.

To develop new antibiotics (green) we need a better understanding of the enzyme (grey) inside the bacteria, which are making the antibiotic useless.

Scientists combined two research methods: High-resolution x-ray diffraction (photons) and neutron diffraction to see directly the atoms inside the enzyme. This understanding allows us to design new effective drugs to win the fight against bacterial infections.



ENVIRONMENT

How can we hear noises through the air?

M. Laaß and B. Schillinger,
Phys. Procedia 69, 628 (2015)



360 million years ago, the first vertebrates that developed from amphibians were not able to hear airborne sound, as this had not been necessary for life in water.

Nevertheless, these animals were not completely deaf. It is believed that they could perceive ground vibrations especially via the jaw resting on the bottom, as do some snakes and crocodiles to this day.

In order to hear the much weaker airborne sound, however, a drum, a middle ear with hammer, anvil and stirrup for amplification and a specialized inner ear are necessary.

Using neutron tomography on skulls from vertebrates, geoscientists have found that airborne sound listening began 30 million years earlier than previously thought.

MATERIAL ENGINEERING

How can we save on fuel?

U. Wasmuth et al.,
CIRP Annals - Manufacturing
Technology 57, 579 (2008)



Internal stresses in metals lead to deformations and even to cracks.

Workpieces made of two different metals, such as cylinder liners in the engine block of cars, are affected by such residual stresses. The light metal casting of the engine block, which is cast around the bushing, contracts more during cooling than the liner itself. It comes to tensions.

Neutrons that hit atoms of aluminum and steel measured the change in atomic distances. The scientist showed that the computer programs that simulate the stresses of the composite casting during cooling calculated the tensions three times higher than they actually were.

The car industry will now be able to build lighter engines and thus reduce fuel consumption.

CULTURAL HERITAGE

Did Napoleon die of arsenic poisoning?

X. Lin et al.,
Anal. Bioanal. Chem. 379, 218
(2004)



The debate on the cause of Napoleon's death on 5th May 1821, was fueled, when a high content of arsenic was found in his hair in 1961. Hair cut from Napoleon seven years before his death, in his exile on Elba, and two hairs cut immediately after his death on the island Helena, were irradiated with neutrons. Using the so-called neutron activation analysis the scientists could define the exact amount of arsenic in the hairs of Napoleon.

The results show that the arsenic in his hair had even declined within those seven years between the two haircuts and was not enough to be poisonous.

It is rather suggested, that the arsenic stems from outer contamination as it could be found on wall paper or in drinking water.

On the contrary, the scientists found a very high concentration of antimony (Sb) in the hair cut immediately after his death favoring another poisoning theory.

„The Olympic games of neutrons and photons“

Ca. 4600 visitors in 5 days



„The Olympic games of neutrons and photons“

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„The Olympic games of neutrons and photons“

Visit of the French science minister Frédérique Vidal



- The aftermath



EU Neutron added 7 new photos to the album ESOF2018 - Science in the City Festival - at Place du Capitole, Toulouse. Published by Anja Greg 11 July at 12:24

EU Neutron @EUNeutron

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ESOF2018 - Science in the city festival

12 people reached

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Zsuzsanna Tóth, Christine Kuhnle and Katarina Stojanovic



SquareKilometreArray @SKA_telescope · Jul 10

We're delighted to be in Toulouse, France 🇫🇷 - European City of Science in 2018 - to engage with members of the public as part of @ESOF_eu's Science in the City festival! You can follow our outreach updates via our Instagram story! [instagram.com/ska_telescope/](https://www.instagram.com/ska_telescope/)



CERIC-ERIC @CERICnews

The ERF team from @CERICnews @SKA_telescope @ESO @MAXIVLaboratory @HZBde @FusionInCloseUp @NeutronSources is ready to answer to your #science questions in the heart of #Toulouse. #ESOF2018 ...



yes

Tweets	Following	Followers	Likes	Lists	Moments
1,997	395	682	574	4	0

8 16

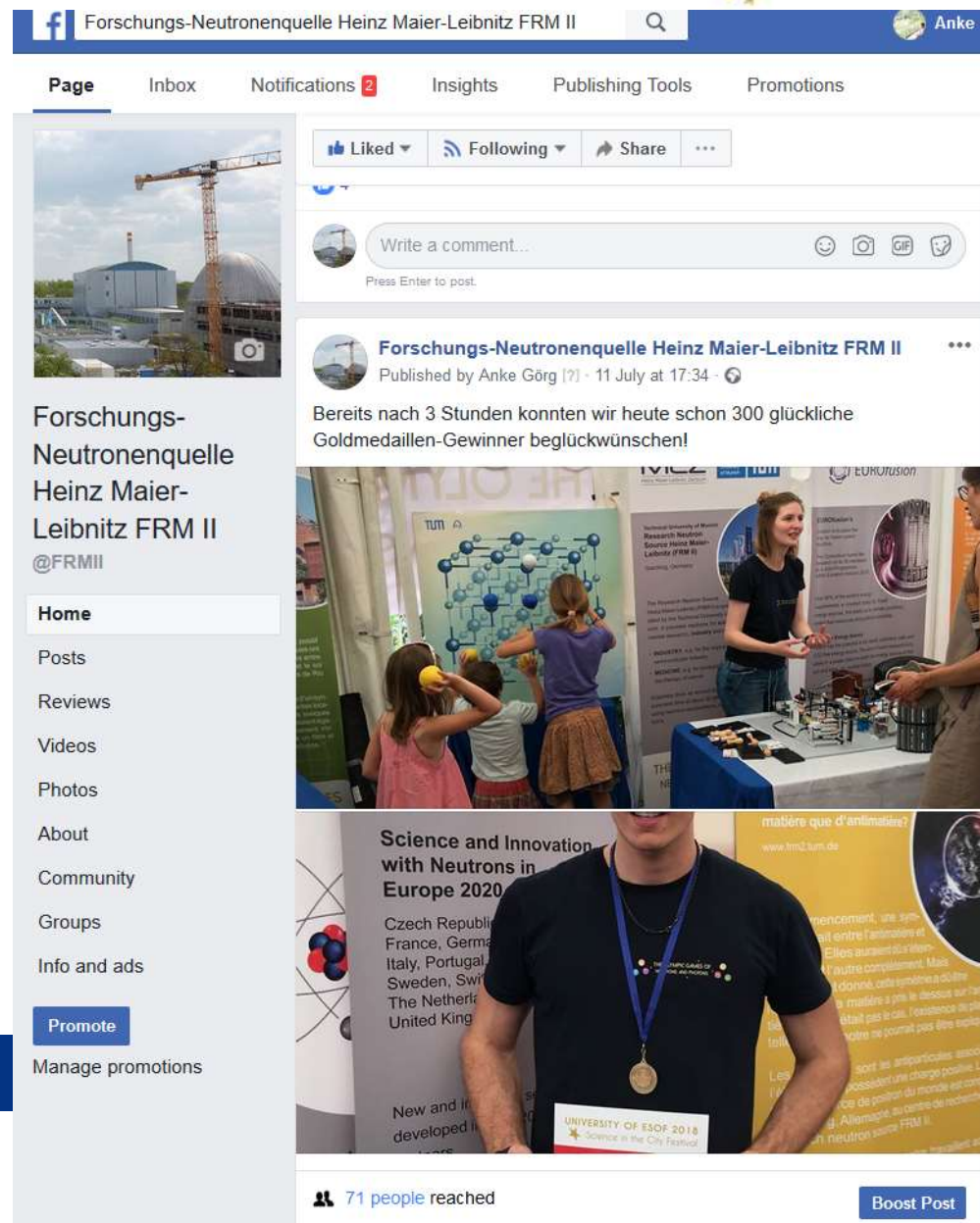
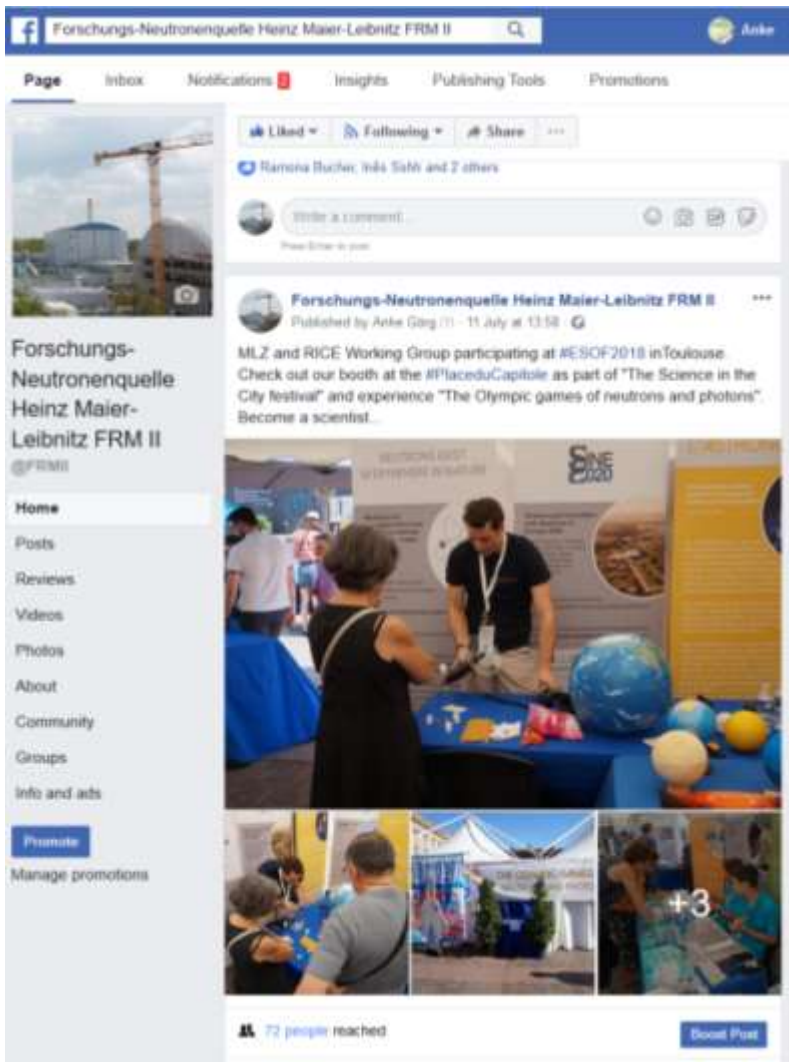
EU Neutron @EUNeutron · Jul 11

SINE2020 and RICE Working Group participating at #ESOF2018 in Toulouse. Check out our booth at the #PlaceDuCapitole as part of "The Science in the City festival" and experience "The Olympic games of neutrons and photons". Become a scientist...



NEUTRONS EXIST EVERYWHERE IN NATURE

• The aftermath



Thanks for your attention!



by Anke Görg, Andrea Voit @ MLZ