



Cultural Collisions

creative science engagement



ORIGIN

CREATIONS summer school July 8th 2018

Michael.Hoch@cern.ch for the CMS collaboration

Why creative science engagement & inquiry based learning

Expanding STEM education through arts immersion result in students
(=> STEAM) getting

4 x more likely to participate in math or science fair

4 x more likely to be recognized for academic achievements

Why creative science engagement & inquiry based learning

In the way how students approach big scientific concepts their thinking process change

-> Ownership

-> Critical Thinking

Facilitate 21st century learning approach by cross discipline learning

Why creative science engagement & inquiry based learning

- How do we inspire students on scientific Concept ?
- How scientists work and why are they scientists ?
- Are scientists creative ?

Global Networking International Collaborations

learning from Particle Physics

- **CREATIONS** spin off – teaching networking and collaboration with large science institutions
- Involve Authentic real local people from different disciplines
- Particle Physics is a global endeavour
- Particle Physics Community is used to
 - collaborate world wide and with very large number of people
 - vast diversity of cultures
- This is very special, not many other science field are as well networked and globally -> let's use this experience and network

art@CMS program Mission



Engagement & Networking

Help our science community to reach out to the general public and especially young people by connecting the arts with the beauty of particle physics, physics and science in general to better understand the world we all experience.



What We Do

Exhibitions

The outcome of collaboration between artists, art institutes, scientists and CMS institutes and act as catalysts for promoting public interest and understanding of science.

no limits of arts, photo, painting sculpture, music, dance,

science & art workshops

Interdisciplinary in their nature, SciArt workshops enable young people to gain a better understanding of science, to be inspired and encouraged, and to develop skills that are critical to the challenges of the 21st century.

science learning (masterclass) followed by creative art production

Exhibitions

Split/ Palazzo Milesi



Bonn / Deutsches Museum



FermiLab

London / CLS



Brooklyn NY

Athens / Technopolis



Higgs Discovery Celebration on Capitol Hill
Washington D.C. USA
November 20, 2013



Sofia / Earth & Man Museum



Brussels / Academy Palace

Exhibitions

Torino / Museum Ettore Fico



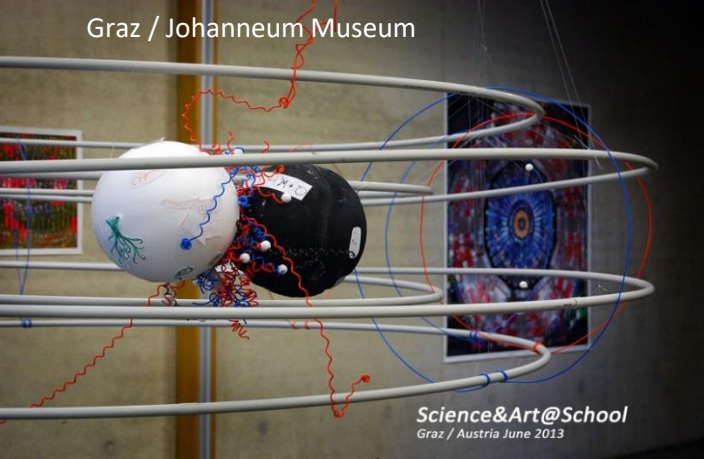
Cessy / CERN P5 CMS



Vienna / University



Graz / Johanneum Museum



Science&Art@School
Graz / Austria June 2013

Valencia / Congress Palace



Geneva / Art Centre ECOLINT



Geneva / Ferme de la Chapelle



Brooklyn NY / SFC



Vienna / Collegium Hungaricum



Vevey / Gallery Ferrari



St Petersburg / Library

Interdisciplinary methodology


Interdisciplinary teaching requires at least

one **Art teacher** & one **Science teacher**





- SciArtMasterclass
- Science&Art@school
- Cultural Collisions

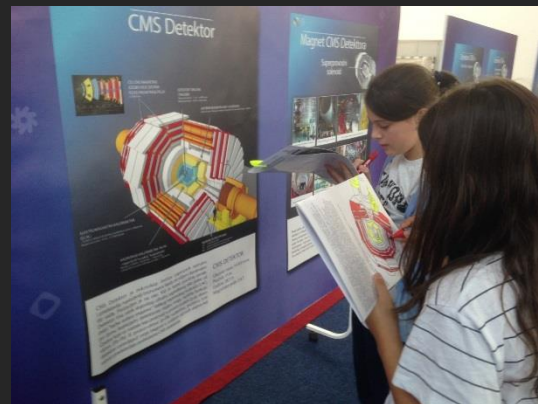
sciARTmasterclass – one day event

Otvoreni dani nauke
Mladi naučnik
5-9 godina



Ime: _____ Godine: _____

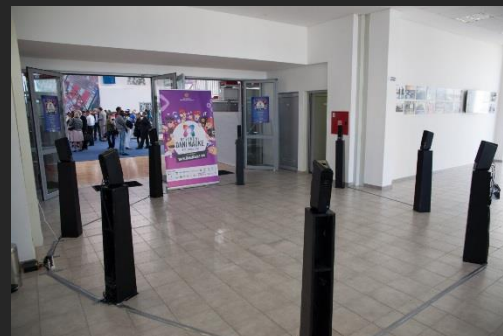


During a one day event :

CMS Junior Scientist Program interdisciplinary Exhibition with: real detector & accelerator equipment, art works, creative corners , lectures and detector workshops as well as sciART workshops.

Montenegro 2017: <https://www.youtube.com/watch?v=9vflW-Pf7vg>

Athens 2015: <https://www.youtube.com/watch?v=tT8MHsCaYks>



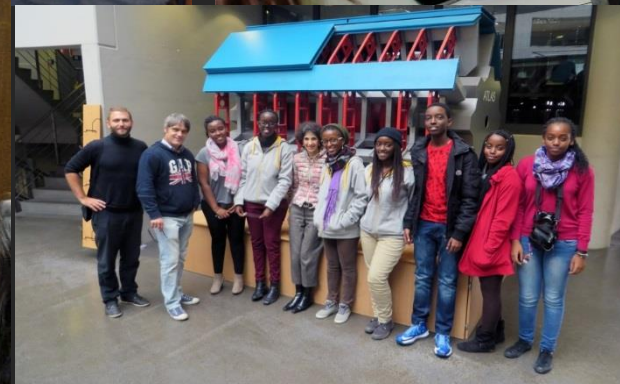
Science&Art@School methodology

incorporated in the school year

- First in Graz Austria 2012/ 2013

- <http://www2.gibs.at/de/2013/05/scienceartschool-2/>
- <http://www2.gibs.at/de/2014/04/scienceartschool-4/>
- <https://home.cern/students-educators/updates/2013/07/learn-science-add-art-scienceartschool>

- Helping participating teacher with material, Virtual Visits and contacts
- Organizing masterclasses with local scientists and art inspiration talks
- Art teacher works with students (supervised by science teacher) at school
- Exhibition of student artworks in a nice venue outside school



Science&Art@School ECOLINT : <https://www.youtube.com/watch?v=yTqDm0Yp04E>





More than **110 seminars** about science and art. **1.000 students** visited Università/INFN locali.

20 schools visited INFN National Lab. About **2.000** at National Museum.

The exhibition “**I colori del Bosone di Higgs**” for more than 100 days presented **410 artworks produced by students**.

People involved: P. Paolucci, A. Di Crescenzo, M. Merola, B. Rossi e G. Galati (Napoli) D. Menasce (Mi), S. Paoletti (Fi), M. Fedi (Fi), E. Vannuccini (Fi), M. Michelotto (Pd), Uff. Com. INFN, M. Hoch (CERN/Vienna) e A. Alexopoulos (CERN) Milano, Padova, Venezia, Firenze and Napoli Artistic, Scientific and Classic Lyceums.

Project Leader Art&Science Across Italy: pierluigi.paolucci@na.infn.it

38 schools, 100 teachers and more than 3000 students

Cultural Collisions

incorporated in the school year

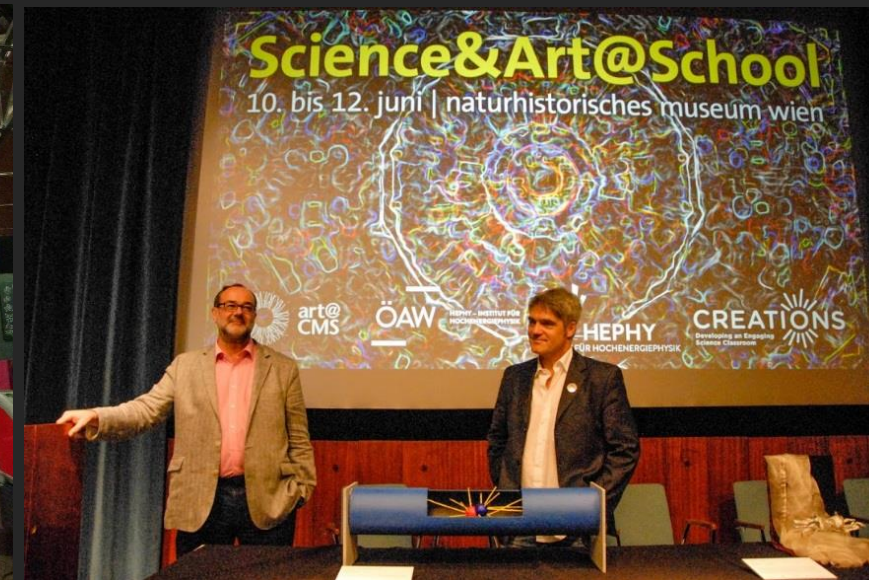
preparation/ exhibition/ lectures / workshops/ creation at school / student exhibition

You are cordially invited to Cultural Collisions

An art exhibition, music and dance performance presented
by Austrian and Genevese students



Photos : CERN Bldg 40 became a stage for students



CERN Meyrin Bldg 40

February 24th 2017

In the presence of His Excellency Thomas Hajnoczi,
Permanent Representative of Austria to the international organizations in
Geneva / Switzerland

18h30 Opening
19h00 Welcome
19h15 art show & performance by Haydn Gym. Vienna,
Herz Jesu Gym. Salzburg, ECOLINT LGB Geneva,
20h00 Drinks
21h00 Close



art@CMS INFN Italian Tour has similar activities and creates synergies between various action to inspire students



Cultural Collisions 2016/2017

events 2017 in Vienna (June) and the Cultural Collisions event at CERN (February) :

This is a Horizon 2020 EU project CREATIONS <http://portal.opendiscoveryspace.eu/creations>

Photos of the event in the Natural History Museum Vienna June 2017: <https://goo.gl/photos/esmfuMAx8Xr5K3V66>

Videos of the science&art@school event in the NHM :

Rhythm of Science : <https://youtu.be/DjKH7f1PNpI>

Cultural Collisions – dance : https://youtu.be/Bly_iERk5Ps

Science Rap “Particle Love”: <https://youtu.be/sdB2PydXUW8>

Cultural Collisions @ CERN February 2017

Photos: <https://goo.gl/photos/2tpnAg7TnsWEjq9q6> https://1drv.ms/f/s!Al-rN-l0kS2sg_gLpGmn7xOEnwjlfQ

Video of a student of the workshop @ CERN: <https://www.youtube.com/watch?v=TEsgtwUv6xk>

CCC Cultural Collisions CERN – a dance performance by students @ CERN: <https://youtu.be/ETjKwUS0yfg>

Cultural Collisions Canada 2018

- The **Ontario Ministry of Education**, invited **art@CMS**
 - to organize an interdisciplinary Science & Art exhibition/workshop/ lectures
 - Based on methodology organized already 2016/2017 at
 - CERN (February 2017)
 - Natural History Museum Vienna (June 2017)
 - Montenegro (October 2017)
- **ORIGIN**: an international scientific collaboration of experiments & institutes was formed to act as scientific support and advisory board
 - art@CMS, ATLAS, CLS-Canadian Light Source, CMS, LIGO/VIRGO, Muographer, Perimeter Institute,**
- activity: week-long **exhibition, workshops and lectures**
- venue: «**Ontario Science Centre** » Toronto



ORIGIN



Cultural Collisions

by ORIGIN - Canada

Content: **Science**: from Astrophysics to Particle Physics

Art: International art@CMS collaborative artists and local artists



- First exhibition April 9th – 15th 2018 -> **Research & Inspiration for students**
 - Second exhibition: May 29th – June 3rd -> **students art-works presentation**
 - Official research project of the Ontario Ministry of Education -> evaluation of educational impact / result foreseen after summer
 - Origination structure:
 - **Toronto Ministry of Education**: general organization, education advisor, evaluation (Lisa Cole)
 - **art@CMS**: Exhibition curation, lectures and workshop planning (scientific & creative)
 - **ORIGIN**: Scientific curation
- art@CMS, ATLAS, CLS-Canadian Light Source, CMS, LIGO/VIRGO, Muographer, Perimeter Institute**
More institutions are interested to join: **TRIUMF, Snowlab, ICEcube**

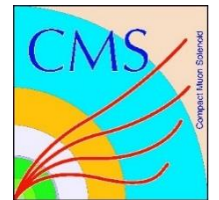
Cultural Collisions by Origin-Canada



Invited by the **Ontario Ministry of Education**
and supported by **ORIGIN** - collaboration



Canadian Light Source
Centre canadien de rayonnement synchrotron



UNIVERSITY OF
TORONTO



Cultural Collisions @ Ontario Science Centre



- **Exhibition:** science posters, real hardware, real size photos, relevant artworks
 - **20 lectures:** 10 scientific & 10 creative
 - **32 workshops:** 16 scientific and 16 creative
- Participants : ~ 600 high school students

- **April 9th** lectures, science flash mob, science rap and sonification performance
 - opening in the presence of officials from the Ministry and OSC CEO and board members
- **April 11th** Wednesday night talk *“Great Conversation Speakers Series”*
 - Michael Hoch >> “Science engagement through the Arts”
<https://www.ontariosciencecentre.ca/Calendar/369/>

Video walk through the exhibition: <https://www.youtube.com/watch?v=4Hkrr1mCz7o>

Press article: <https://research2reality.com/space-quantum/the-large-cultural-collider-of-physics-and-art/>



Science personal dialogue



Science & Creative demonstrations



Creative workshops



Specialized topic talks



General science talks

Young audience



Cloud Chamber Workshop



Life Size Photo Wall



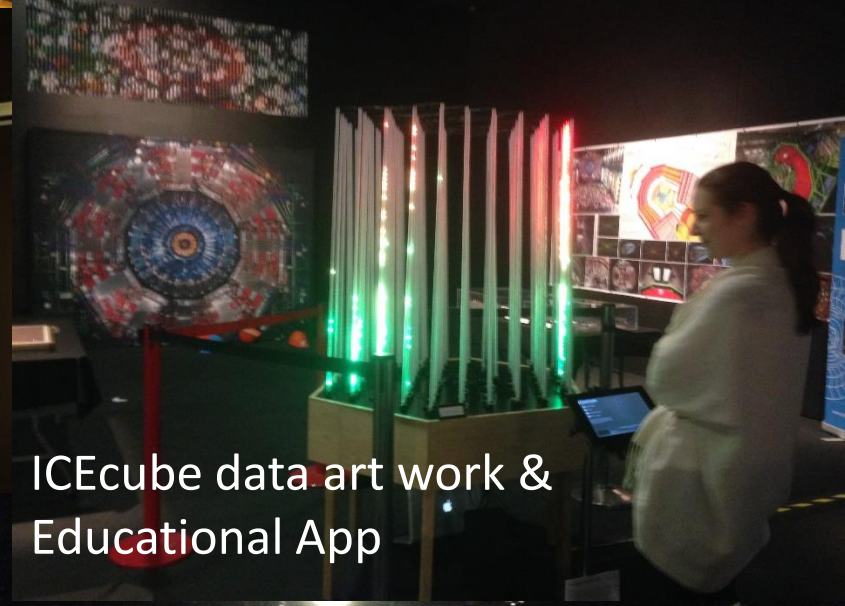
Rap Workshop



Creative Photo Wall



ICEcube data art work & Educational App



General Science Morning Introduction Talk



Exhibition & Great Conversation Evening

“Science engagement through the Arts”



LHC tunnel Photo wall



Science Centre CEO Maurice Bitrain



Direct dialogue



M. Hoch presentation



Guided tour through the exhibition



Entrance CMS life size photo

Concert at the Royal Music Conservatory

Scott Wilson (BEER) world premier "Dark Matter"



Data Sonification Workshop



World Premier "Dark Matter"



Pre Concert Conversation



Pre Concert Conversation



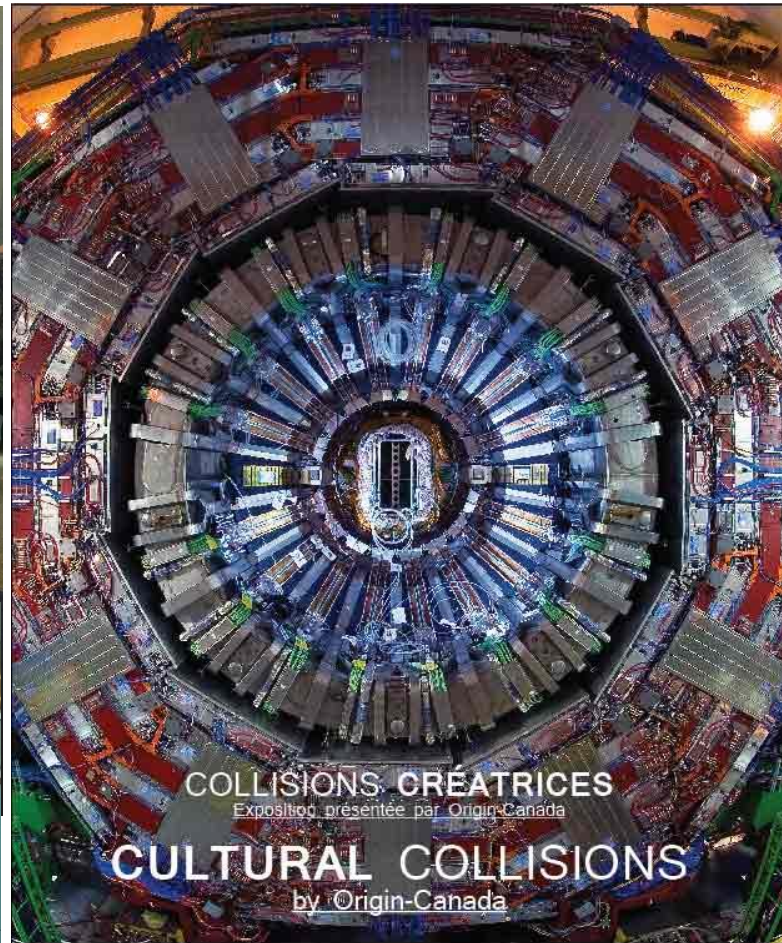
OSC data sonification
Life demonstration

Cultural Collisions - science engagement methodology

© Michael Hoch

- Participating science teacher receive science support material
- Organization of a Virtual Visit with participating experiments
- Curate in collaboration with public venue - “RESEACH & INSPIRANTION” experience
- Use the framework of the exhibition to organize a series of
 - LECTURES on science and art topics
 - WORKSHOPS – science workshops as well as creative workshops
 - Further activity for students and general public:
 - special topic talks
 - round table discussion with scientists and specialists of other fields in the arts, education or completely different
 - documentary film presentations (e.g. “The Beauty of Science”, “ATLAS
- Send the school groups back with the challenge to do on their own further scientific research and create science related artworks under the supervision of the science teacher & the art teacher
- Organize a second exhibition in a prominent venue where the results of the student artworks are presented
 - Possibility : selection of the best artworks, competition and award for the best artworks ?

Second Exhibition - Student Results - artWorks



STUDENT ART ŒUVRES ÉTUDIANTES
INSPIRED BY SCIENCE INSPIRÉES PAR LA SCIENCE

From May 29 to June 1, 2018 Du 29 mai au 1^{er} juin 2018

Danforth Collegiate and Technical Institute
École secondaire Toronto Ouest
University of Toronto School

Student Exhibition Opening – Rap & Dance Performances



Rap performance & HipHop



Cultural Collisions / Collisions Créatrice

Student ART inspired by Science

Date : May 29th till June 1st
Venue : Ontario Science Centre / Toronto
Participating Test schools : Danforth Collegiate and Technical Institute
Ecole Secondaire Toronto Quest
University of Toronto School

Diversity of artistic expression :

Science Rap (lyrics & beat& performance), HipHop dance, painting, drawing, digital painting, video animation, mixed media sculpture, ...

Format fosters science engagement and triggers students to do more research on their own.

-> process **followed by the Ministry of Education**

-> **evaluation result** expected: end summer 2018

art@CMS: collaborative artist CONSENSUS

CONSENSUS participates as well in science & artworkshops

*UK Rapper launches album **CONCERNED***

after 2 years of collaboration his science rap album ConCERNed. His scientific partner is Sudan Paramesvaran / CMS Bristol UK

CERN Article (all info):

<http://cms.cern/news/concerned-using-hip-hop-engage-new-audiences-particle-physics>

More Infor & Links:

- The BBC interview of ConSensus and Sudan [the sequence starts at 1:11.18 until 1h26.26]
- <http://www.bbc.co.uk/programmes/p04zv0g0#play>
- <https://www.youtube.com/watch?v=MJXaBq5VTNc>
- Press article in the journal “The Voice” here's the online version:
- <http://www.voice-online.co.uk/article/south-london-geneva-hip-hop-science-lessons>
- 3 music videos of the 9 tracks from the album is available on youtube
- <https://www.youtube.com/watch?v=tJl8-ArzkBg&feature=youtu.be>
- <https://www.youtube.com/watch?v=1ju3fo37yLE&feature=youtu.be>
- <https://www.youtube.com/art@CMS> -> consensus Anti Matter
- Science Rap StudentsWorkshop “Particle Love”: <https://youtu.be/sdB2PydXUW8>



CONCERNED

CONSENSUS

Feynman inspired art

a construction manual

Andy Charalambous in collaboration with CERN HST Programme 2017



Fig.1: Coreen, 2012

1. Introduction

When I left school I went to work as a technician for the Physics and Astronomy department at a university in London. I trained as an engineer and spent many years designing and building equipment for the research groups there. My interest in science grew as I worked with these groups and got a better understanding of the science they were researching. I loved my job because it gave me so much insight into the science involved.

When I left that job and started as an artist I found that the excitement of science was something I didn't want to move away from. So, I decided to use science as the inspiration for my art. Most of the art I make comes from some bit of science that has seeded an idea. Science is a tool for letting us see our world more clearly, and for me it also inspires my work. By the way, I have not moved very far from the university I worked at. I am Artist in Residence for the Astronomy group and the High Energy Physics groups there, as well as being part of the art@CMS project run by Michael Hoch at CERN.

sciARTbooklet

a manual for an art and a science teacher to re- create and create topical artworks

art@CMS 2017

UK collaborative artists :
Rachael Nee , Andy Charalambous

in preparation:
"data sonification" by Federico IT,
"particle detection" by Ch. Henschke AU

Orders of Magnitude – Potato Powered Cosmos

a construction manual

Rachael Nee in collaboration with HST Programme 2017



1. Introduction

This booklet is written for science and art teachers with the aim of interdisciplinary learning. It assumes no knowledge of the other disciplines subject. In it you will read about the art installation from both the science and art viewpoints and how to reconstruct it. This becomes a jumping off point for the development of new artworks by High School students, with questions along the way.

Science and contemporary art have different end goals; however, they also have a lot in common. Both contemporary art and science have similar methodologies involving; investigation, research, testing out of ideas and theories through experiment. They share imagination, curiosity, quest for knowledge and are forms of inquiry. When successful both allow the world to be seen in new ways.

Cultural Collisions projects in the pipeline

**ORIGIN collaboration – scientific advisory and support
inviting further experiments and institutions to participate**

**Cultural Collisions Canada – after the evaluation of the ministry in August
designing a travel exhibition
planning a tour through Ontario
expanding**

**Cultural Collisions Balkan – start Autumn 2018 – Croatia, Montenegro, Bosnia, Albania
using 'lessons learned and design from Canada
inviting institutions from all Countries
fundraising
schedule a tour until 2021**

Cultural Collisions Australia – under discussion with Queensland Academy

Thanks

for all professional and creative input

for these projects given by our **CREATIONS** community !

As well special thanks for all the productive discussions and important input
Sofoklis Sotiriou and Franz Bogner

Further thanks to Manolis Chaniotakis, Giannis Alexopoulos for their
constant support.

contact:

Michael.Hoch@cern.ch phone: +41 75411 5720

<http://mhoch.web.cern.ch/mhoch/Art@CMS/Art@CMSprojects.pdf>

Whom am I

scientist - artist - educator

Studied in Vienna

University of Technology – Applied Physics

University Vienna – Physics & Sport to become High School Teacher

Art Academy Vienna – diverse Art courses

PhD at CERN – Gaseous Detector Development

Staff at CERN – ALICE – TPC field cage design & construction

CERN user since 2008 – CMS physicist CMS construction

since 2012 – art@CMS

since 2018 - ORIGIN

