



# Cultural Collisions

cross-disciplinary

science education

engagement & networking



**Not all students need to become scientists**

**Foster curiosity by diversifying the 'communication language'**

**To cope with the challenges of the 21<sup>st</sup> century :**

**All students need to develop critical thinking foster curiosity and learn to apply scientific methodology.**



We (scientific community) are not the only one who ask **THE BIG** questions mankind is interested in since the **beginning of time**.

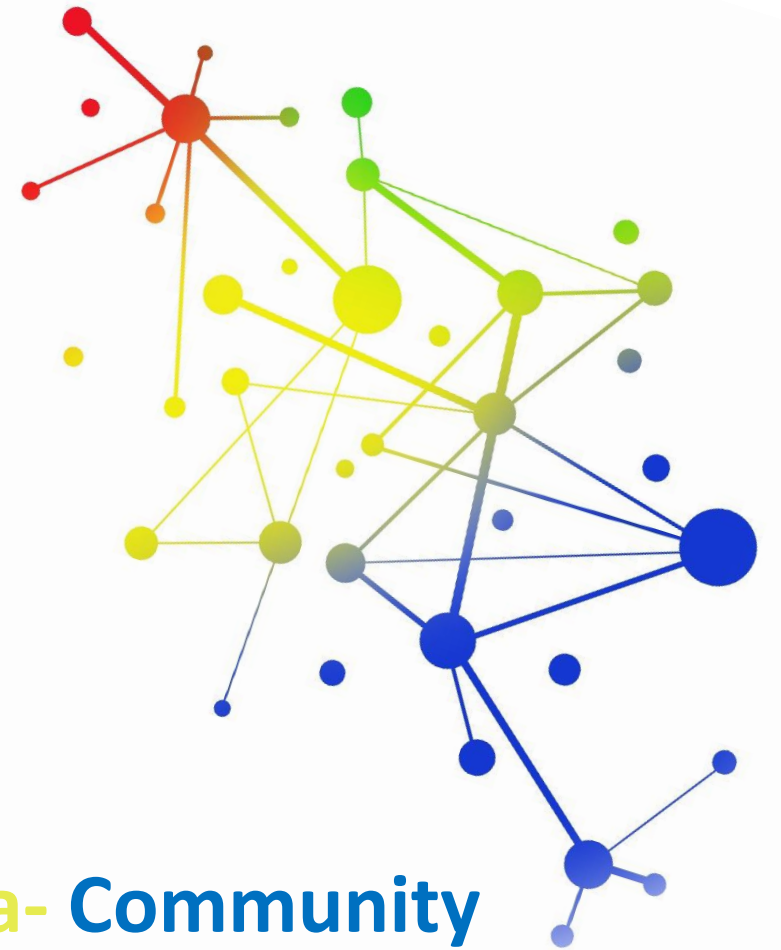
Obvious solution:

**TEAM up with other Communities**

**Communities outside Particle Physics  
outside Science Community**

**Creative- Art- Music- Lyrics- Dance- MultiMedia- Community**

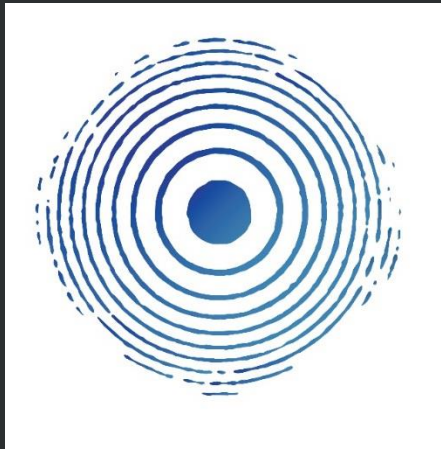
**Cross-Disciplinary Engagement**



Since 2017

Since 2012

# TEAM Up – create synergies in the storyline



**ORIGIN**

## Supported by

ATLAS, ALICE, CMS, LHCb,  
LIGO, VIRGI, ICEcube,  
Muography, Perimeter Institute,  
Canadian Light Source, and other  
international partners

Particle Physics  
Astrophysics  
Gravitational Waves  
Neutrino-Physics  
Muography  
Accelerator  
Technology

## Methology develped & disseminated since 2012

By CMS collaboration via art@CMS

Global Cross Disciplilnary science engagement & networking program



# ORIGIN program **Mission**



## Interdisciplinary science **engagement** & **networking**

Help our science community to reach out to **especially school students**, general public and policy makers to relate and engage actively with various science topic via the arts or creative involvement.

“Arts as a tool to engage actively –

Empower them to own the topic and allow them to contribute”

Scientific Methodology triggers Critical Thinking

Art fosters Creative Thinking

# sciARTmasterclass

## Science&Art@School

### Cultural Collisions

3 models for different implementation scenarios © Michael Hoch

- 1) **sciARTmasterclass** — short engagement scenarios e.g. science festivals
- 2) **Science&Art@School** — authentic school student engagement & inspiration
- 3) **Cultural Collisions** — full cross disciplinary science engagement inspiration & research

#### AWARDS received :

2017	European Physics Society
2018	Montenegro Ministry of Science /MO
2019	Oman Ministry of Education /OM
2020	Ontario Ministry of Education / CA

# Cultural Collisions

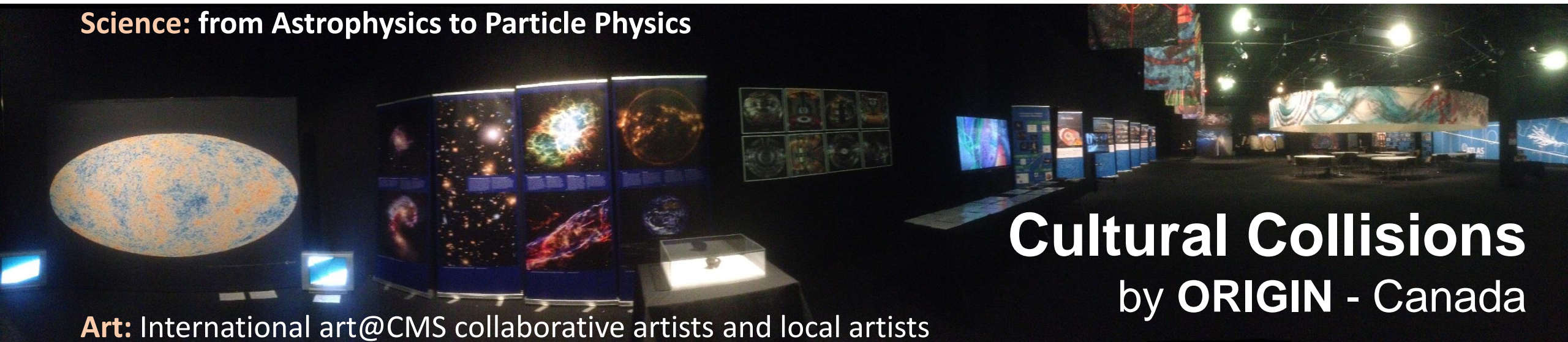
**Cultural Collisions** – introducing modern science in school curriculum school year

- 1) Support teacher to prepare students:
  - 1) offer online educational material, 2) organize virtual visit 3) network with local Institutes and offer discussions
- 2) Cross Disciplinary exhibition – on ORIGIN topic enhanced by artworks reflecting the science topics
  - 1) science presentations , art presentations, meet the scientist and artists, public talks
  - 2) science workshops & art workshops (IPPOG masterclass, Cloud Chamber, creative experiments, Science FlashMob ....)
- 3) Students are working at School during the art classes supervised by Science teacher on science topics
- 4) Student Art exhibition – final presentation of the outcome of the dialogue

**Organizing local ORIGIN network** – always representing the local institutes

**act locally - think globally**

# Science: from Astrophysics to Particle Physics



## Cultural Collisions by ORIGIN - Canada

**Art:** International art@CMS collaborative artists and local artists

**Venue:** Ontario Science Centre, OSC

**First exhibition April 9<sup>th</sup> – 15<sup>th</sup> 2018**  
student research and inspiration

**Second exhibition: May 29<sup>th</sup> – June 3<sup>rd</sup>** at OSC :  
students art-works presentation

A formal evaluation by the Ministry of Education

**Organization:**

**creation of ORIGIN**

**Toronto Ministry of Education:** general and education organization,  
evaluation

**art@CMS:** Exhibition curation

**ORIGIN:** Scientific curation

**art@CMS, ATLAS, CLS, CMS, LIGO/VIRGO, Muography, Perimeter Institute**

**More institutions are interested to join: TRIUMF, Snowlab**



**ORIGIN**



# Cultural Collisions Canada — week schedule



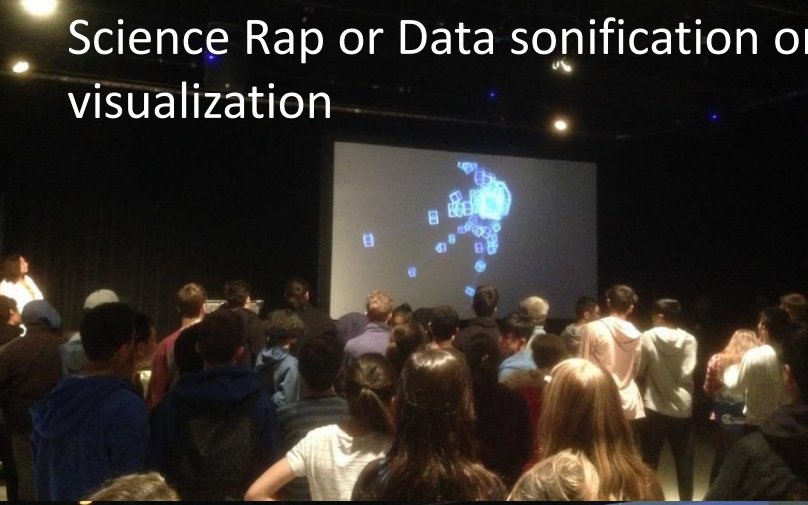
Cultural Collisions Project with Origin - Maximum number of students per day (Tuesday - Friday) is 100 to accommodate workshops - Exhibit can always handle visitors

	Monday April 9, 2018	Tuesday April 10, 2018				Mercredi 11 avril 2018				Thursday April 12, 2018				Friday April 13, 2018				Saturday April 14, 2018	Sunday April 15, 2018
	Schools: Danforth Collegiate, Ecole secondaire Toronto Ouest, University of Toronto Schools	Danforth Collegiate (60 grade 9 and 11 Students) and University of Toronto Schools (6 Grade 11 students) + OSC invitations				Ecole secondaire Toronto Ouest (61 étudiants - 10e et 11e année) - École francophone				University of Toronto Schools (95 students - Grade 8, 10) - Shifted schedule 30 minutes later - Start time is 9:30 am this day only!				Open for Ontario Science Centre Invitations to Participate - York Region Schools				Open to the public - Open at 10 am	Open to the public - Open at 10 am
9:00 AM		20 Minute Talk: Karola Dette, University of Toronto - From Particle Physics to Astrophysics				Mini-présentation: Karola Dette, Université de Toronto - De la physique des particules à l'astrophysique				20 Minute Talk: Karola Dette, University of Toronto - From Particle Physics to Astrophysics				20 Minute Talk: Karola Dette, University of Toronto - From Particle Physics to Astrophysics					
9:30 AM	Opening Event (9:30 - 10:00) - Richard Franz, Maurice (OSC), Rock Paper Science Hall (RPS)	Workshop 1A	Workshop 1B	Workshop 1C	Workshop 1D	Atelier 1A	Atelier 1B	Atelier 1C	Atelier 1D	Workshop 1A	Workshop 1B	Workshop 1C	Workshop 1D	Workshop 1A	Workshop 1B	Workshop 1C	Workshop 1D	Exhibit area activities will be available for the public	Exhibit area activities will be available for the public
9:45 AM		9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	9:30 - 10:30 am	
10:00 AM		What keeps us stuck to the Earth? (EN)	Playing with Data (EN)	Particle Surprise in a Cloud Chamber (EN/FR)	Celestial Luminescence	Qu'est-ce qui nous garde les pieds sur Terre? / What keeps us stuck to the Earth? (EN)	Jouer avec les données (EN/FR)	Surprise de particules dans une chambre à nuages (EN/FR)	Celestial Luminescence	What keeps us stuck to the Earth? (EN)	Playing with Data (EN)	Particle Surprise in a Cloud Chamber (EN/FR)	Celestial Luminescence	What keeps us stuck to the Earth? (EN)	Playing with Data (EN)	Particle Surprise in a Cloud Chamber (EN/FR)	Celestial Luminescence	People to be within the exhibit area to support the programming	People to be within the exhibit area to support the programming
10:15 AM		Perimeter Institute	CMS - CERN, University of Notre Dame	ATLAS, CMS, CERN	York University	Institut Périmètre	CMS - CERN, University of Notre Dame	ATLAS, CMS, CERN	York University	Perimeter Institute	CMS - CERN, University of Notre Dame	ATLAS, CMS, CERN	York University	Perimeter Institute	CMS - CERN, University of Notre Dame	CMS - CERN	York University	Open till 8:00 pm	Open till 6:00 pm
	Science Flash Mob (10:00 - 10:45)	Kelly Foyle and Kevin Donkers	Tom McCauley	Michael Hooh	Robin Kingsburgh	Dave Vrolyk et Nathan Chow	Tom McCauley	Michael Hooh	Robin Kingsburgh	Dave Fish and Damian Pope	Tom McCauley	Michael Hooh	Robin Kingsburgh	Olga Michalopoulos	Tom McCauley	Michael Hooh	Robin Kingsburgh		
10:30 AM		30 students	30 students	30 students	15-20 students	30 étudiants	30 étudiants	30 étudiants	15-20 étudiants	30 students	30 students	30 students	15-20 students	30 students	30 students	30 students	15-20 students	Pop up Public Talks	Pop up Public Talks
		RPS Hall	Room: Workshop 4	Room: Dry Lab	Exhibit area	Salle avec des tables -RPS Hall	Salle: Workshop 4	Salle: Ecosystems Lab	Aire d'exposition	RPS Hall	Room: Workshop 4	Room: Dry Lab	Exhibit area	RPS Hall	Workshop 4	Ecosystems Lab	Exhibit area	11 am - 20 Minute Talk: Peter Krieger, University of Toronto - ATLAS / LHC	
10:45 AM		10:45 am - Talk in Exhibit Area - By Perimeter Institute - Dr. Kelly Foyle, Black holes and the Event Horizon Telescope				10:45 am - Brigitte Tessier, Artiste collaboratrice de la France & Montreal - "QUI DES DEUX INSPIRE L'AUTRE: Le SCIENTIFIQUE ou L'ARTISTE?"				10:45 am - Talk in Exhibit Area - By Perimeter Institute - Dr. Damian Pope - Hidden Patterns in Physics				10:45 am - Talk in Exhibit Area - Peter Krieger					
11:00 AM		Exhibit Area with Scientists and Artists				Aire d'exposition avec les scientifiques et les artistes				Exhibit Area with Scientists and Artists								12:00 pm - 20 minute talk: David Griffin (OCAD University)	
11:15 AM	Moderated Panel: Meet the Scientists and Artists! (10:45 - 11:15)													Exhibit Area with Scientists and Artists				1:00 pm - 20 Minute talk: Robin Kingsburgh	
Lunch	11:15 am - 12:00 pm	11:30 am - 12:15 pm				11:30 am - 12:15 pm				11:30 am - 12:15 pm				11:30 am - 12:15 pm				3 pm - 20 minute Talk: Consensus Science Rep	
12:00 PM		12:15 pm - Talk in Exhibit Area - Michael Hooh or Robin				12:15 pm - Talk in Exhibit Area - Peter Krieger				12:15 pm - Talk in Exhibit Area - Peter Krieger				12:15 pm - Talk in Exhibit Area - consensus				Volunteers Coming:	Volunteers Coming:
12:15 PM	Performance of Consensus, interactive component, Scott Wilson with the audience and then Q & A	Workshop 2A	Workshop 2B	Workshop 2C	Workshop 2D	Atelier 2A	Atelier 2B	Atelier 2C	Atelier 2D	Workshop 2A	Workshop 2B	Workshop 2C	Workshop 2C	Workshop 2A	Workshop 2B	Workshop 2C	Workshop 2C	Peter Krieger (ATLAS Canada, Professor, U of T)	Peter Krieger (ATLAS Canada, Professor, U of T)
12:30 PM		12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	12:45 - 1:45 pm	Michael Hooh CMS
		Listening to Einstein's Universe (EN/FR)	Playing with Data (EN)	Accelerating Colours (EN/FR)	Science through Rap	Écouter l'univers d'Einstein (EN/FR)	Des données créatives au son (EN/FR Maybe)	Accélérer les couleurs (EN/FR)	La science à travers le rap	Listening to Einstein's Universe (EN/FR)	Creative Data to Sound (EN)	Accelerating Colours (EN/FR)	Science through Rap	Listening to Einstein's Universe (EN/FR)	Creative Data to Sound (EN)	Accelerating Colours (EN/FR)	Science through Rap	Wen Yi Song (ATLAS Canada, York University)	Bianca Ciungu (ATLAS Canada Toronto MS)
12:45 PM		LIGO, University of Glasgow	CMS - CERN, University of Notre Dame	CMS - CERN, Collaborative Artist from Montreal working in France	Consensus	LIGO, University of Glasgow	BEER, University of Birmingham	CMS - CERN, Collaborative Artist from Montreal working in France	Consensus	LIGO, University of Glasgow	CMS - CERN, University of Notre Dame	CMS - CERN, Collaborative Artist from Montreal working in France	Consensus	LIGO, University of Glasgow	BEER, University of Birmingham	CMS - CERN, Collaborative Artist from Montreal working in France	Consensus		
1:00 PM	Workshops and Activities in Exhibit Area																	Lisa Cole	Lisa Cole
1:15 PM	Activities in the exhibit area	Martin Hendry	Tom McCauley	Michael Hooh and Brigitte Tessier	Antoine Gittens-Jackson	Martin Hendry	Scott Wilson	Michael Hooh	Antoine Gittens-Jackson	Carl-Johan Haster	Tom McCauley	Michael Hooh	Antoine Gittens-Jackson	Heather Fong	Scott Wilson	Michael Hooh	Antoine Gittens-Jackson	Consensus	Vincent Pascuzzi (ATLAS Canada Toronto F)
1:30 PM	Prompts?	30 students	30 students	20 students	20 students	30 étudiants	30 étudiants	20 étudiants	20 étudiants	30 students	30 students	20 students	20 students	30 students	30 students	20 students	20 students	Brigitte Tessier	
1:45 PM	Interaction with staff, scientists in the staff	Room: RPS Hall	Dry Lab	Exhibit Area	Room: Studio 3	RPS Hall	Workshop 4	Aire d'exposition	Salle: Dry Lab	Room RPS Hall	Workshop 4	Exhibit Area	Room: Studio 3	Room: RPS Hall	Workshop 4	Exhibit area	Dry Lab	Bianca Ciungu (ATLAS Canada MSc Student, Toronto)	
2:00 PM	Artists present in exhibit area	Activities in Exhibit Area with Q & A				Activités dans l'aire d'exposition (questions et réponses)				Activities in Exhibit Area with Q & A				Activities in Exhibit Area with Q & A					
2:15 PM																			
2:30 PM	Departure at 2:30 pm	Departure at 2:30 pm				Départ à 2:30 pm				Departure at 2:30 pm				Departure at 2:30 pm					
		Open till 6:00 pm				Ouvert jusqu'à 6:00 pm				Open till 6:00 pm				Open till 6:00 pm					
						Evening Talk - 7:00 pm													

Science personal dialogues



live performances :  
Science Rap or Data sonification or  
visualization



Science Rap workshop



pp - Mini Masterclass

LIGO WS



Creative  
workshops



Specialized topic talks



General science talks





Guided tour through the exhibition



Cloud Chamber Workshop



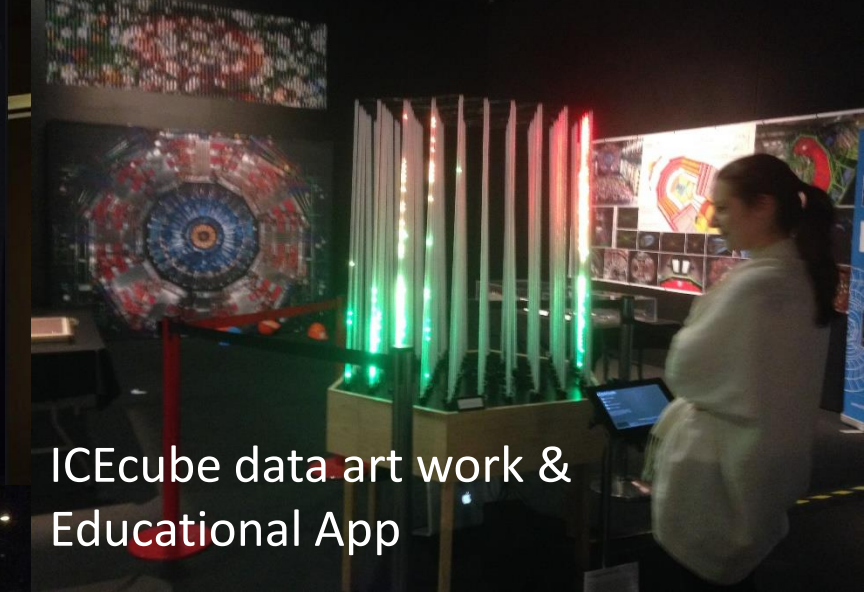
Life Size Photo Wall



World Premier "Dark Matter"



Creative Photo Wall



ICEcube data art work & Educational App

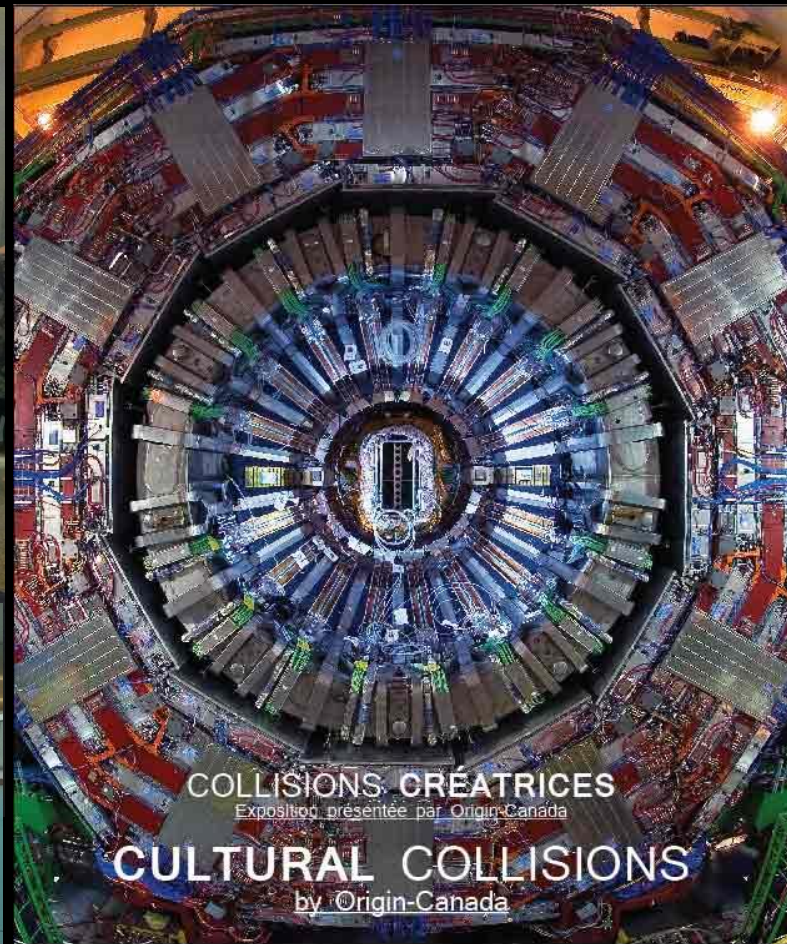


General Science Morning Introduction Talk





# 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<sup>er</sup> juin 2018

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





# Student Exhibition Opening – Rap & Dance Performances



Rap performance & HipHop



# Ontario Ministry of Education evaluation & report



*Some links to documents on the CCC project and the evaluation;  
with courtesy of the Ontario Ministry of Education and Ontario Science Centre;*

## Final evaluation report of the Cultural Collisions Canada

- Exploring the Nexus for Student Learning when the Arts and Science Collide

<https://originnetwork.web.cern.ch/sites/originnetwork.web.cern.ch/files/CC%20Public%20Report%20Final.pdf>

## Final presentation Cultural Collisions Canada

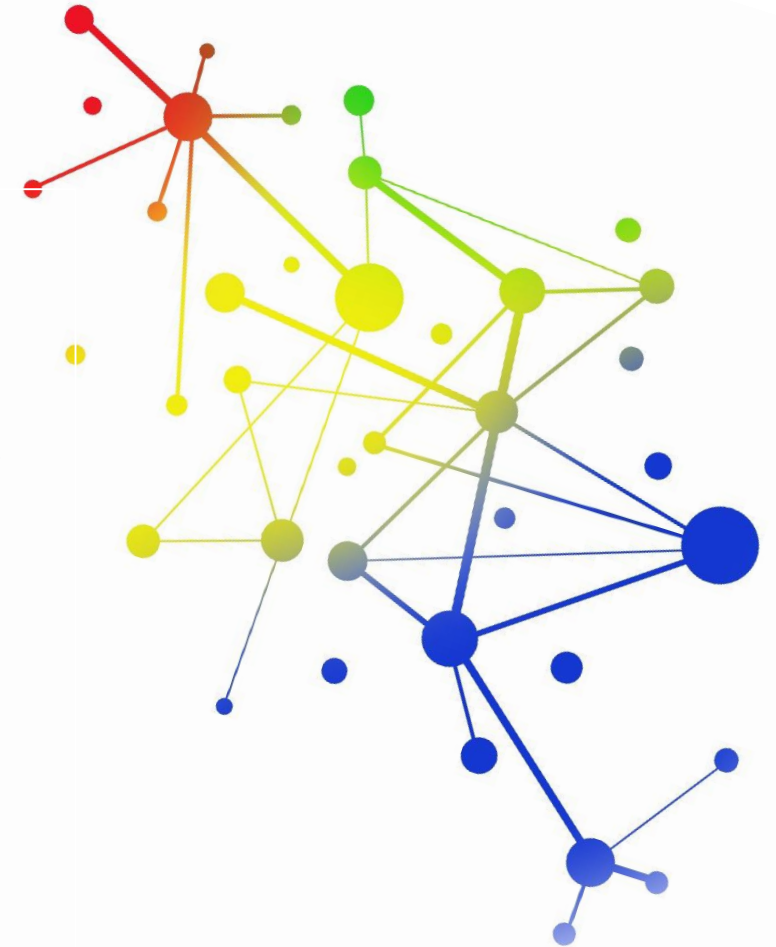
- by Toronto Science Centre & Co

<https://originnetwork.web.cern.ch/sites/originnetwork.web.cern.ch/files/OriginCanadaSlides.pdf>

## video walk through the exhibition

-- Ontario Science Centre

<https://www.youtube.com/watch?v=4Hkrr1mCz7o&t=184s>



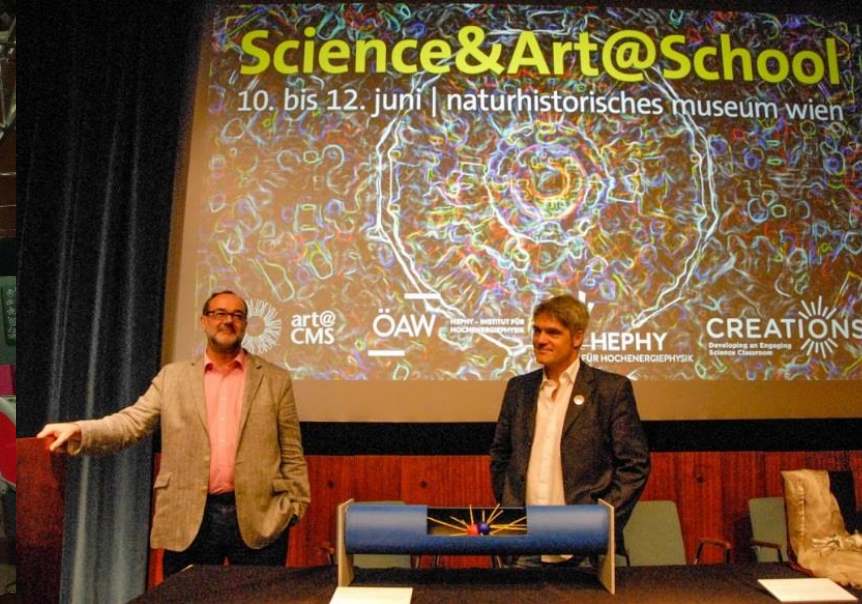
<http://originnetwork.web.cern.ch>

You are cordially invited to  
**Cultural Collisions**

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



2016 : CERN Bldg 40 became a stage for students



CERN Meyrin Bldg 40 February 24<sup>th</sup> 2017

In the presence of His Excellency Thomas Hajnóczi,  
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



2017 and 2018: NHM – National History Museum Vienna Austria  
2017: Museum fuer Vorgeschichte Halle / Germany

# Cultural Collisions Vienna /Austria

science & art exhibition [Univ. Applied Arts Vienna], cross disciplinary workshops for schools

Collaboration HEPHY Institute OeAW/ mumok / ORIGIN / City School Council

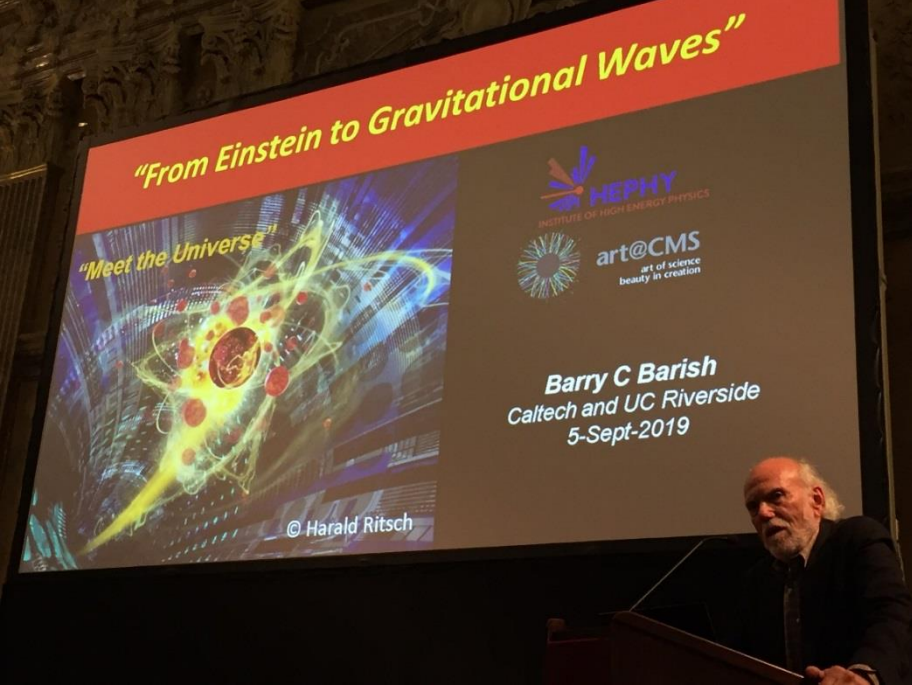
exhibition September 2019; Cultural Collisions September 2019 – June 2020





# Cultural Collisions Vienna /Austria

version WS 2019/2020: 4 days workshop, each day 2 schools, total 240 students





# Cultural Collisions Oman 2019

Cooperation with the Ministry of Education Oman

Oman Science Festival  
2019



## *Educational program:*

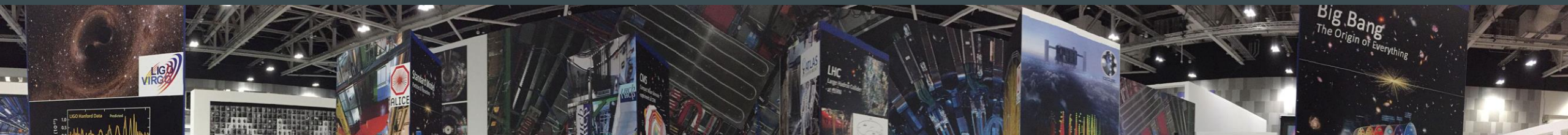
*Target audience: science & art lectures & workshops*

- 1) high school teacher
- 2) high school students
- 3) primary school students

## *Lectures for general public:*

*Target audience:*

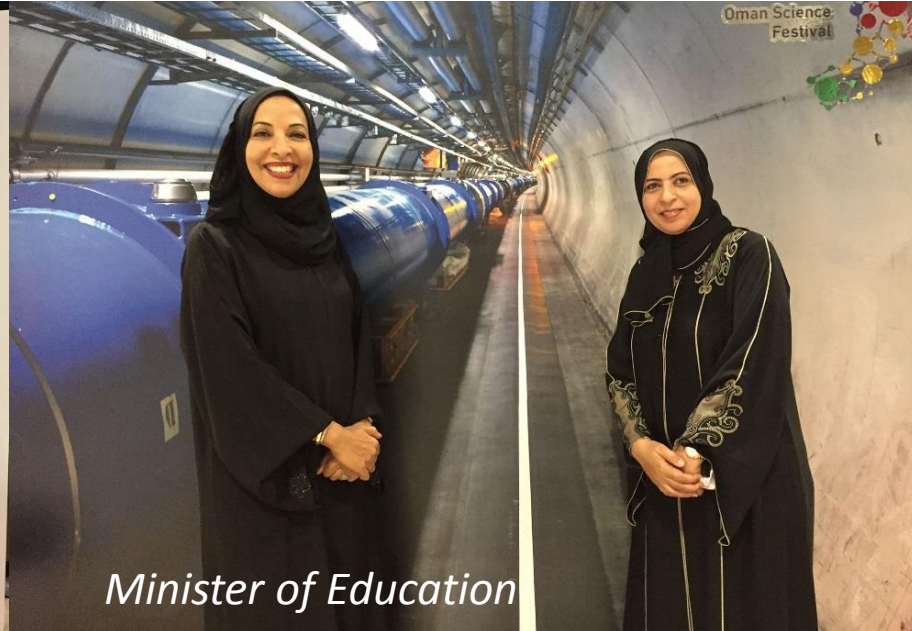
*General Public on the festival*



# Lobbying & networking: Oman Government in the exhibition



Prime Minister



Minister of Education



Prime minister and Minister of Information



Head of Physics State University, Ministry of Education





# Cultural Collisions Prague 2020

## Belnspired@ICHEP2020

Educational program for >120 high school students  
Visit/ Masterclass/ Art WS/ Could Chamber WS/  
Science Flash Mob/

- 1) end of school year exhibition - online June 2020
- 2) ICHEP2020 student exhibition – online July/August 2020
- 3) Exhibition during 20<sup>th</sup> Czech Physics Conference September 2020

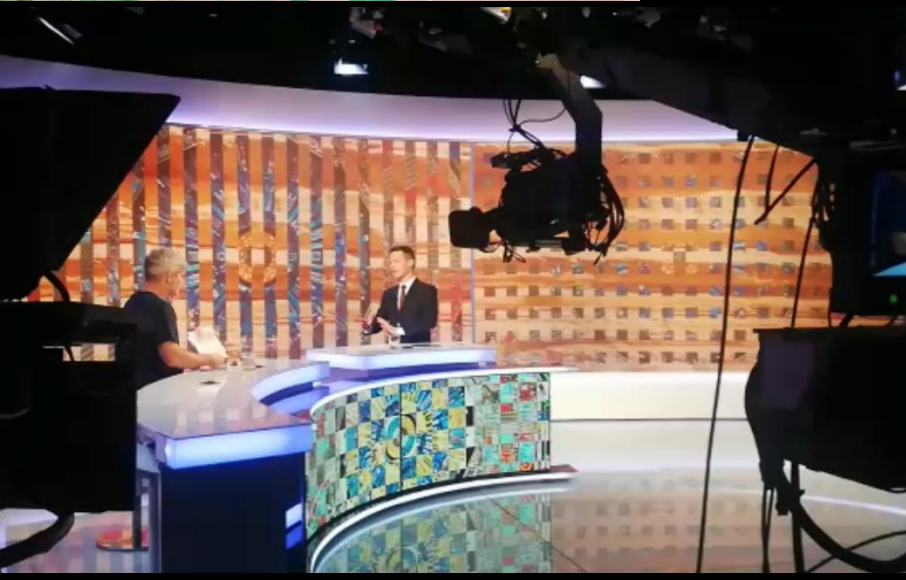
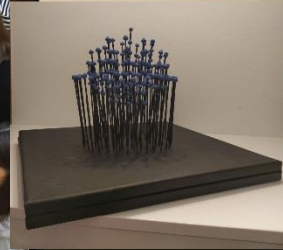
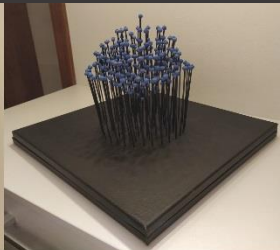
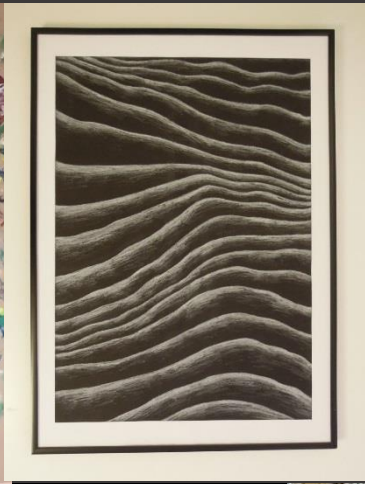




# Cultural Collisions Prague 2020

## BeInspired@ICHEP2020

Art competition, please vote for your favourite: <http://ichep2020.org/beinspired-vystava-hlasovani.htm>



# IBS cultural centre, Daejong / Korea April 24<sup>th</sup> – July 26<sup>th</sup> 2019

## “CMS@CERN the art of science”

Cross disciplinary exhibition, science talks, round table discussions, science cafes, Walk through the exhibition : <https://www.youtube.com/watch?v=817V6pY0ImI>

CMS@CERN  
-The Art of Science

### 신을 쫓는 기계

“우리가 새로운 입자도 드디어 0.9999999999999999까지 확실히 보았어!”

2012년 7월, 미국 일리노이 대학 CMS실험팀이 양성자-양성자 충돌의 한 순간이 포착되었습니다. 우리 눈앞에 입자로 보이는 입자의 속도에 따라 입자의 질량도 변하는 것이 확인되었습니다.

이것이 입자 물리학의 신의 손에 의해 구상된 거대한 입자 충돌 실험을 위해 고안된 CMS 실험입니다. CERN은 현재 가장 최첨단 실험인 LHC(Large Hadron Collider, 대형 입자 충돌기)를 중심으로 입자 물리학의 새로운 시대를 열고 있습니다.

CERN의 과학자이자 예술가 Michael Hochberg, LHC의 주요 실험팀인 CMS(Compact muon Solenoid)를 통해 입자 물리학의 새로운 시대를 열고 있습니다. 그는 현재 입자 물리학에 대해 이야기하는 새로운 입자 물리학의 시대를 열고 있습니다.

‘신을 쫓는 기계’라는 첨단 과학 실험 장치인 CMS 고가의 입자 충돌기를 선보입니다. 입자 충돌 실험 장치라고 하면 예술적인 CMS를 통해 과학의 경이로움에 대한 경이로움을 선사합니다.

이전 전시는 CERN과 CMS를 통해 대중들에게 예술의 힘으로 소개하는 것이었습니다. 이번 전시 CMS 실험, 입자 물리학의 경이로움에 대한 경이로움 속에서 입자 물리학의 경이로움에 대한 경이로움에 대한 경이로움을 선사합니다.

We observe in our data clear signs of a new particle, at the level of five sigma. “Dr Fabiola Gianotti, spokeswoman for the ATLAS experiment at CERN.”

The discovery of the Higgs boson announced by CERN’s European Organization for Nuclear Research on July 14 2012 was met with loud applause and cheering around the world. It is a historic milestone that may enable us to come closer to answering the question “Where do we come from?” “What are we?” “Where are we going?”

The Higgs bosons so called “god particles” are believed to disappear immediately after the Big Bang after unleashing mass to matter. CERN experimentally proved the existence of the new particle with results from the Large Hadron Collider (LHC), the world’s largest and highest-energy accelerator which explores the secrets of the universe.

As a CERN scientist and artist, Michael Hochberg highlights the extraordinary beauty of a large scientific architecture, CMS (Compact muon Solenoid), located at the heart of the LHC. His artworks unveil the world of particle physics in a unique way which makes it easier to comprehend for everyone.

Besides “seeking to find the truth of the universe”, this exhibition presents photography, collage and installations that capture the mystery and beauty of the CMS detector. You will be able to follow the pursuit of humanity to achieve our understanding of nature by viewing CMS data which unveils the ultimate picture of great achievements in modern physics. The magnificent beauty of the technological scientific architecture makes you realize about the boundary between art and science.

We hope that you enjoy this unique exhibition which is the first that features CERN and CMS for Korean people. You will also learn about the contribution that Korean CMS and ATLAS scientists have made in the great attempt to reveal the secrets of the universe.

2019.04.24 - 2019.07.26  
시간 10:00 - 17:00(매주 무료입장)  
장소 IBS과학문화센터 1층 전시관  
대전광역시 유성구 엑스포로55 기초과학연구원IBS  
문의 042.878.8185 / rpsa0417@ibs.re.kr / www.ibs.re.kr

DATE 2019.04.24 - 2019.07.26  
TIME 10:00 - 17:00  
(입장료 없음, 매주 월요일 휴무)

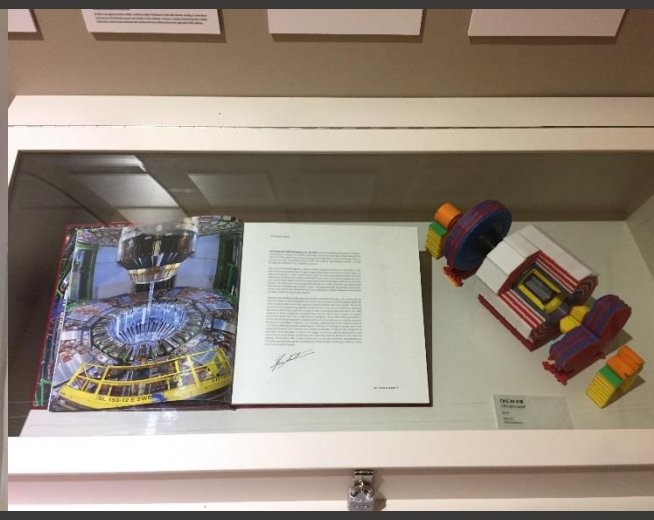
PLACE IBS Exhibition Hall,  
1F of the IBS Science Culture Center,  
Institute for Basic Science (IBS), Yuseong-gu, Daejeon, Korea

INQUIRY 042.878.8185  
rpsa0417@ibs.re.kr  
www.ibs.re.kr

기초과학연구원  
IBS과학문화센터 1층 전시관

IBS Exhibition Hall,  
1F of the IBS Science Culture Center

주최 IBS 기초과학연구원 후원 KOS-과학재단 후원 CERN



# IBS cultural centre, Daejong / Korea April 24<sup>th</sup> – July 26<sup>th</sup> 2019



**T H E**  
**A R T**  
**O F**  
**SCIENCE**

과학의 아름다움

IBS <신을 쫓는 기계> 展 기념 마이클 호처 작가 대중강연

2019.04.24.wed. 17:00 — 18:00

IBS 본원 이문동 8109 | 대전광역시 유성구 엑스포로 55 기초과학연구원



# “Art&Science” Balloon Museum Chateau d’Oex/ CH

April 2019 – March 2020 by art@CMS/ ORIGIN

In collaboration with University Bern, University Fribourg, CHIP, HFSJG

Cross disciplinary exhibition on Cosmic Ray Discovery with Balloons, lectures , Junior Scientist booklet, various science & creative lecture and workshops during Balloon Festival January 25<sup>th</sup> – February 1<sup>st</sup> 2020

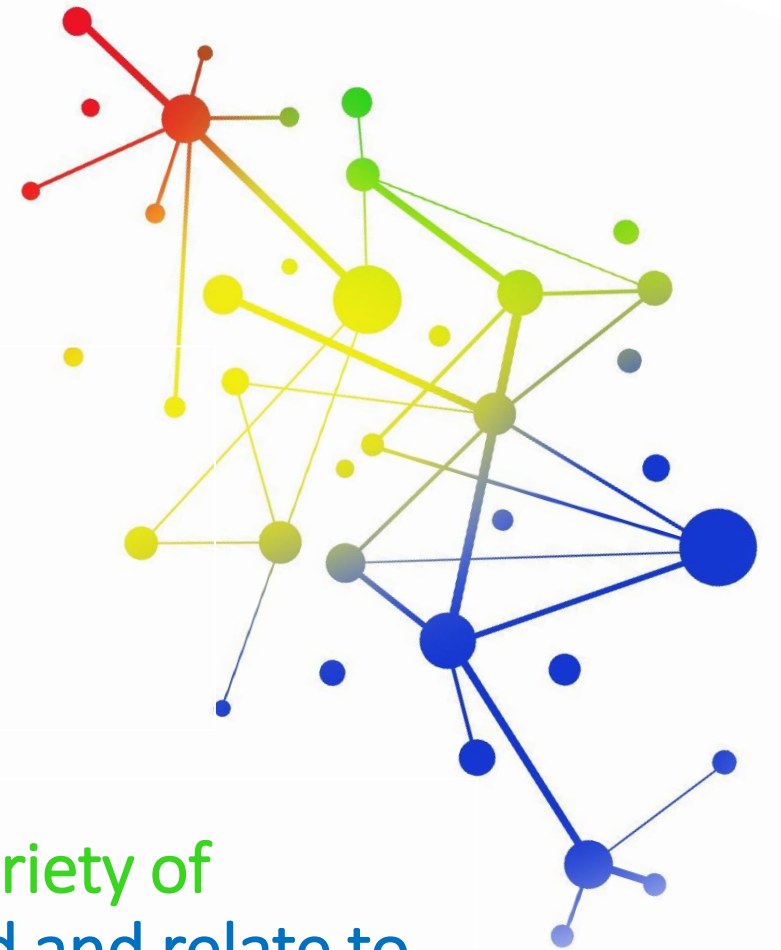


# Summary

**Interdisciplinary engagement** is very powerful to enlarge effort outside our community and especially **allow students to get deeply involved** in the topics with their own mean.

To maximise sustainable **IMPACT** with our recourses -> **engage and collaborate with creative and education institutions**

**Interdisciplinary collaborations** allow to offer a **larger variety of 'languages'** students and general public may understand and relate to.



# Summary

Students need to understand  
Science is a Creative profession  
and the Arts a serious debate on topics.

Thanks for your attention !

For more questions or requests for collaboration please contact: [Michael.Hoch@cern.ch](mailto:Michael.Hoch@cern.ch)

