

CMS Physics Briefings

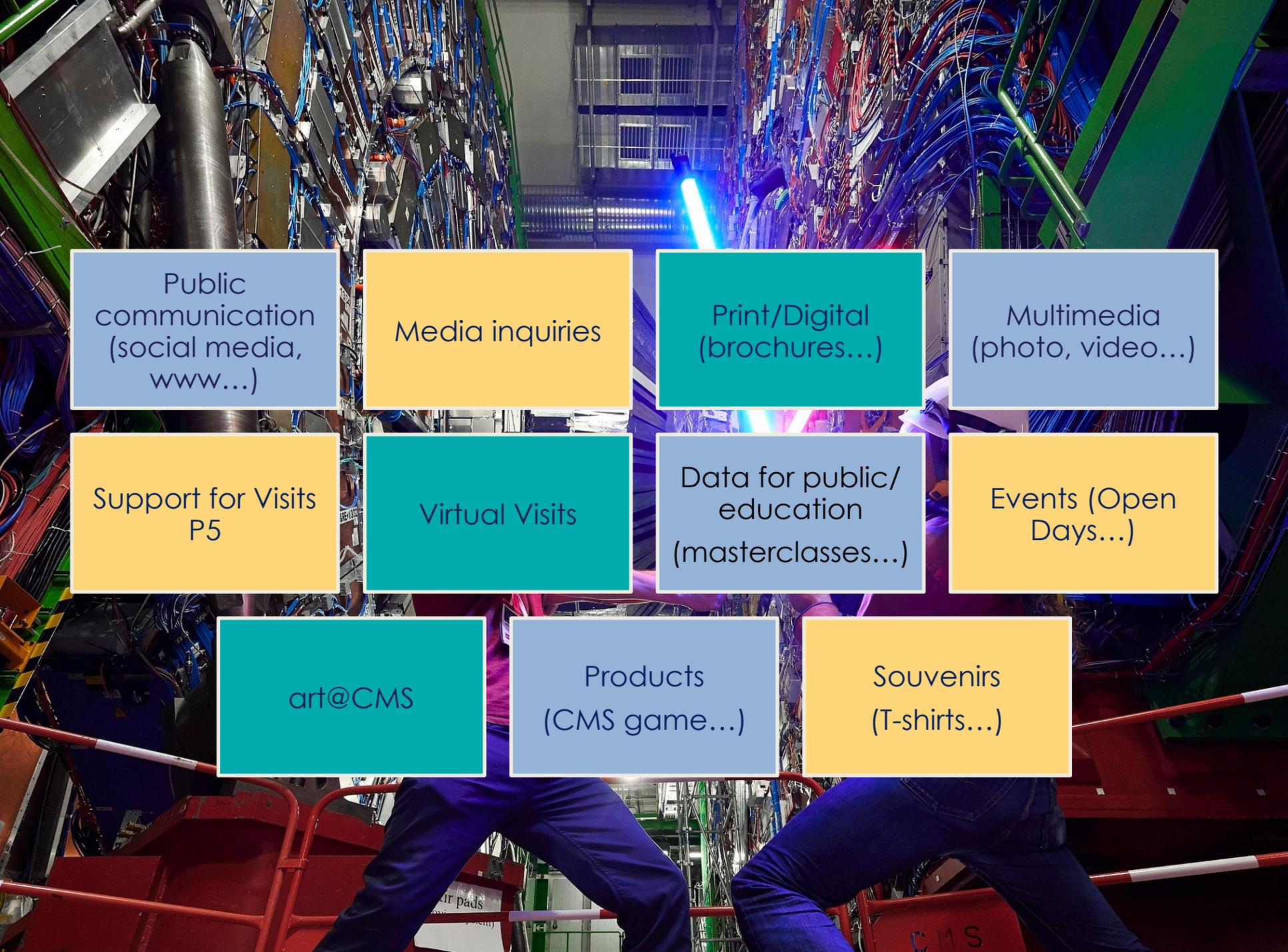
Freya Blekman

DESY and Hamburg University

on behalf of the CMS Collaboration



freyablekman



Public
communication
(social media,
www...)

Media inquiries

Print/Digital
(brochures...)

Multimedia
(photo, video...)

Support for Visits
P5

Virtual Visits

Data for public/
education
(masterclasses...)

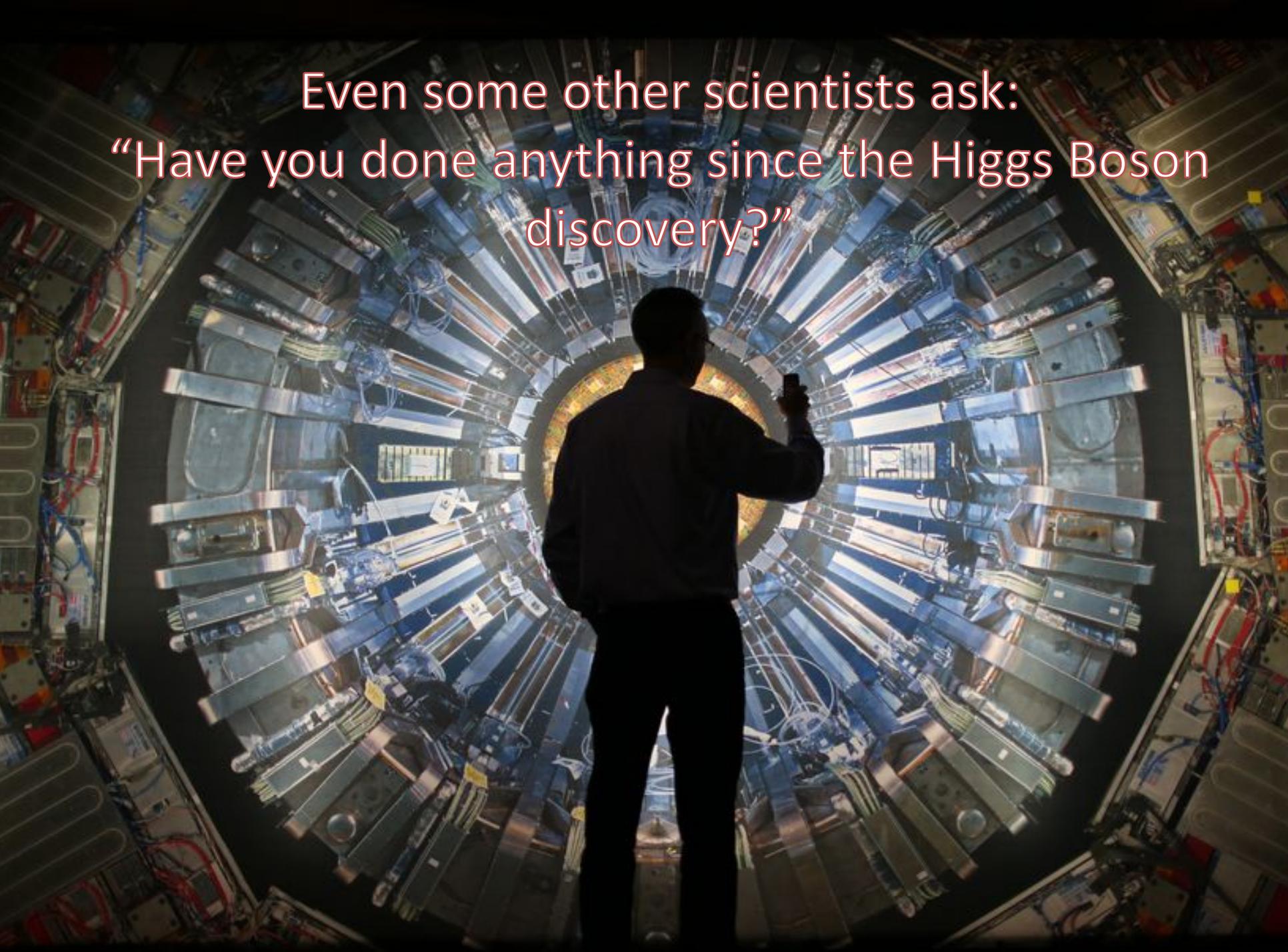
Events (Open
Days...)

art@CMS

Products
(CMS game...)

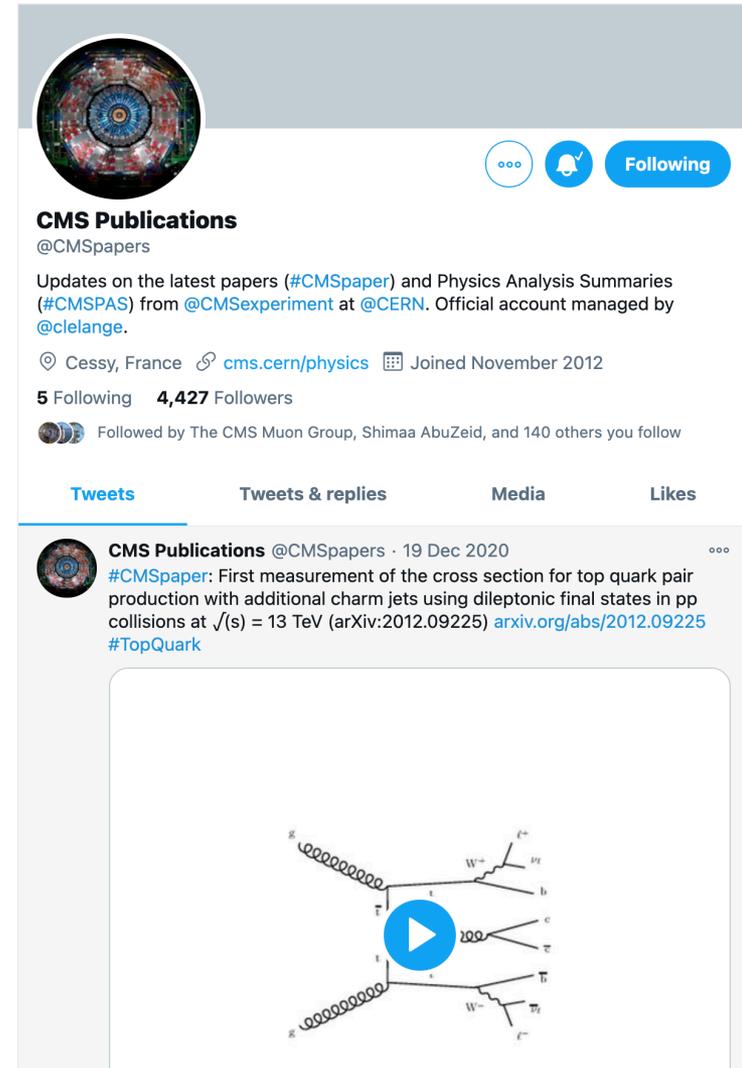
Souvenirs
(T-shirts...)

Even some other scientists ask:
“Have you done anything since the Higgs Boson
discovery?”



Papers beyond arxiv/journal/inspirehep?

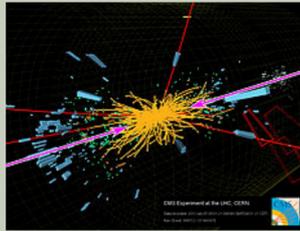
- CMS papers tweet
 - There is an automatic bot that tweets any PAS or paper
 - Including animated .gif of all figures in paper!
- More relevant for communication to scientists in the field
- Also: [searchable papers on web site](#)



October 28, 2011

Fermilab Today

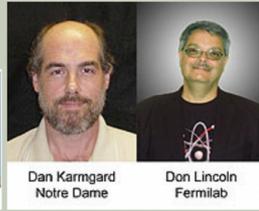
The quarks that miss



Giuseppe Cerati
UC San Diego

Rick Field
U. Florida

Mohammed Zakaria
U. Florida



Dan Kargard
Notre Dame

Don Lincoln
Fermilab

October 14, 2011

Lepton fizz



Marat Gataulin
Caltech

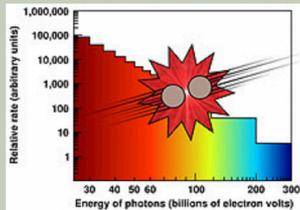
Elizabeth Sudano
UCSD

Yong Yang
Caltech



September 23, 2011

The color of collisions



Vismithara Chettiar
Fermilab

Vanessa Gaultney
Florida International Univ.

Collin Jenep
Notre Dame

Rita Anderson
Univ. of Wisconsin

Adi Benhaim
Caltech

Marat Gataulin
Caltech

Ted Kolberg
Notre Dame

Stephan Linn
Florida International Univ.

Nancy Marinelli
Notre Dame

Marco Pini
U.C. San Diego

Matteo Sani
Duke

Jan Veverka
Caltech

<https://www.fnal.gov/pub/today/archive.html>



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Examples of trailblazers (just from CMS): Fermilab Today CMS Times

Compact Muon Solenoid Times
AUGUST 21, 2006 | CMS OUTREACH HOME | CMS WORK HOME | ABOUT CMS | SEARCH | SUBSCRIBE | CONTACT CMS | ARCHIVE

Forthcoming activities

August

- Mechanical support of FPX ready
- End of RPC "gap" production

September

- Lower HF+ into UXC
- Start of tracker commissioning in 186
- End of RB2 cosmic tests
- End of RE1 installation
- DAQ installation in USC
- Mapping of magnetic field
- Start of ES cosmic calibration

October

- Installation of TIB+ into TOB+
- End of MTCC
- Lowering of first endcap discs
- End of CSC installation
- Preparation of DTs complete
- End of long-term tests of RPCs

[Major events in 2006](#)
[CMS meetings calendar](#)

Introduction

A Word from the Editors

Welcome again to the CMS Times. This is the beginning of a new venture for CMS Outreach and we greatly appreciate the comments and suggestions that we have received during the past week. Please keep them coming! We also look forward to more suggestions for articles to include in this newsletter. In particular we would like to communicate activities that are sometimes over-shadowed by the "big" events taking place, so if you have an idea for a story then please let us know. Note that we wish to keep the articles quite short (150 words maximum) to optimize readability.

Communication Questionnaire

In the opening session of the June CMS Week some representatives of the CERN Technology Transfer section distributed printed copies of a questionnaire whose aim is to assess the methods of communication within our collaboration etc. A similar questionnaire has been distributed to the other LHC experiments. The results from this questionnaire are also valuable to CMS, to assess the collaborative aspects etc. so we invite those of you who have

Feature Stories

CMS transfers over 3 PB in three months

Amount of data shipped to CMS sites via Wide Area Network integrated over time. The results obtained from the CMS "load test" exercise in context of the LCG Service Challenge 4 which is ongoing since May.

CMS is pleased to report that in the last 91 days we have transferred over 3.3 PB in wide-area transfers between storage systems. Of this, disk-to-disk SC4 (LCG Service Challenge 4) transfers account for just over 3 PB and our recent two high-throughput Tier-0/Tier-1 disk-to-disk tests for most of the rest.

This translates to an achieved rate of ~1 PB/month in CMS world-wide, and for comparison, well in excess of the Tier-0/Tier-1 data rate expected for the first full year of LHC running. We are very pleased to have demonstrated wide-area transfers in the right ballpark one year before LHC turn-on. This is an important and encouraging milestone even if much work still remains.

Click on the image for a high resolution version.

Submitted by:

L. Tuura, L. Fisk and M. Ernst

The Computing, Software and Analysis challenge (CSA06)

Submitted by:

D. Stokland

MTCC Latest News

One of the first events reconstructed in DT, HCAL and Tracker at 3T.

Thursday August 17 the CMS coil reached a new high field of 3.78 T with a current of 17550A. Everything behaved well and the fast dump was the smoothest so far. The coil has now been re-cooled to 4.9K and the next run, targeting 4T is scheduled for Tuesday 22. This run will also finish in the last (scheduled) fast dump. We hope to then run the magnet over the weekend before closing down the first phase of the MTCC on Monday 28.

In the green barrack life the activity has been intense. The ECAL group has been working flat out to get into Global running, and has made excellent progress; we expect to run with ECAL at 4T. In last weeks run we ran with all Muon systems (DT, CSC, RPC) in the trigger and with all detectors other than ECAL in readout. We took a final run at 3.78T with ECAL just before the fast dump.

The offline analysis has also been proceeding well with feedback from the quasi-online CPT-MTCC teams at CERN and at the FNAL-ROC. Problems of data transfer from the online to offline plagued the early part of the week but were eventually resolved on Friday.

On the 28/29 work will start to open CMS, remove the Tracker and ECAL modules and equip the coil for a field measurement campaign in October. In this second phase of MTCC long systematic runs are planned for the Muon and HCAL systems.

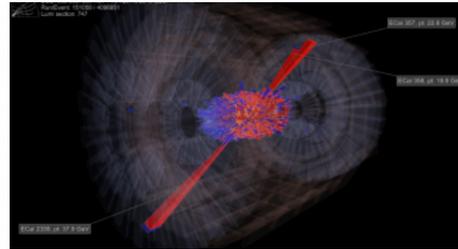
<https://cds.cern.ch/record/979798?ln=en>



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CMS news about physics

- Of course: CMS has been consistently producing news items since Run 1
- These were (typically) written by the communications team
- Results chosen by Spokespeople et.al.
- Infrequent and did not always reach many people

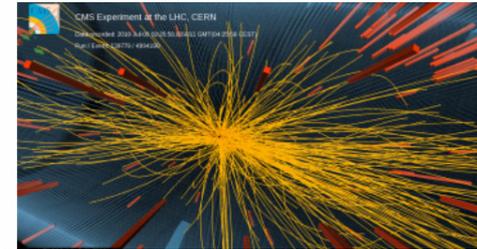


FIRST Z BOSONS DETECTED BY CMS IN HEAVY-ION COLLISIONS

🕒 04 NOV 2010 | 👤 ACHINTYA | 📁 PHYSICS

Z bosons produced in collisions of heavy ions have been observed for the first time by the CMS experiment at CERN's Large Hadron Collider (LHC). CMS observed 10 events containing a distinctive candidate Z boson reconstructed from a pair of electrons...

[READ MORE](#)



NEW TWO-PARTICLE CORRELATIONS OBSERVED IN THE CMS DETECTOR AT THE LHC

🕒 21 SEP 2010 | 👤 ACHINTYA | 📁 PHYSICS

The CMS Collaboration at CERN released today a paper entitled "Observation of Long-Range Near-Side Angular Correlations in Proton-Proton Collisions" that details signs of a new phenomenon in proton interactions. A study of "high multiplicity"...

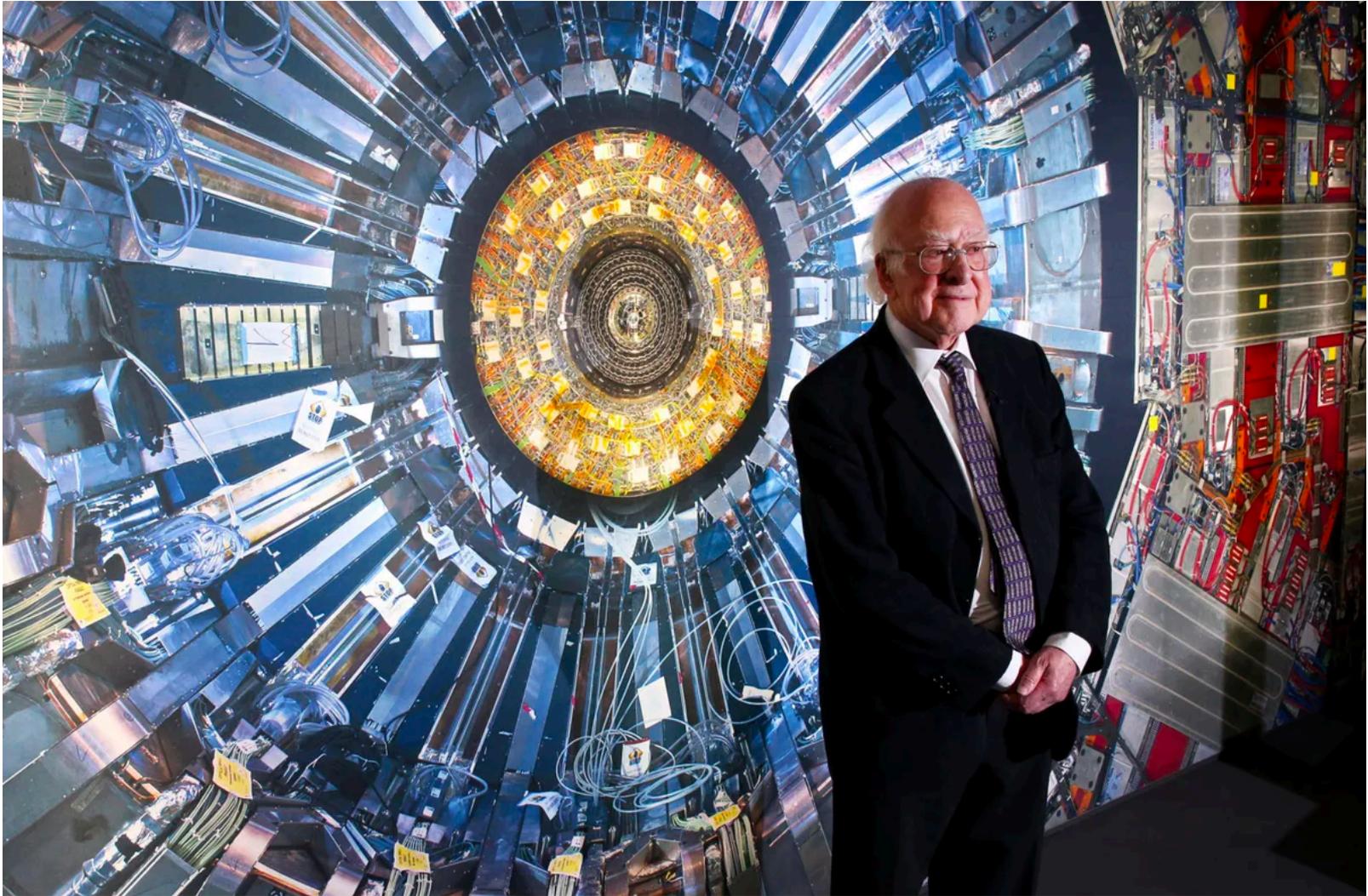
[READ MORE](#)



What changed?



What changed?



What changed?

The screenshot shows a YouTube channel page for 'CERN'. The channel name 'CERN' is at the top. Below the header, there are several video thumbnails with titles and view counts. On the left side, there is a subscriber count graphic showing '160+' and a Twitter icon for 'freyablekman'. The videos include:

- Large Hadron Rap** (8.1M views, 11 years ago)
- I'm a Physicist At CERN We've Done Something We Shouldn't Have Done part one** (5.5M views, 4 years ago)
- The CERN black hole** (5.3M views, 12 years ago)
- Robin and The Backstabbers - Sat dupa Sat (CERN campaign)** (4.7M views, 5 years ago)
- Why This Stuff Costs \$2700 Trillion Per Gram - Antimatter at CERN** (3.1M views, 8 months ago)
- Sacrificio humano en el CERN** (2.7M views, 3 years ago)
- Anonymous - Everyone Needs to Pay Attention to This! (CERN ALERT MESSAGE 2017-2018)** (2.3M views, 2 years ago)
- Scientist and the Elite Try to Hide What Really Happened at CERN, Demonic Entities, Extra Dimensions** (2.1M views, 1 year ago)
- Step inside the Large Hadron Collider (360 video) - BBC News** (1.4M views, 4 years ago)
- Cern - The Message (Magdelayna's Apollo Mix)** (1.4M views, 5 years ago)
- CERN · 宇宙を破壊するやばすぎる実験なのか? (下ネタあり)** (1.3M views, 2 years ago)

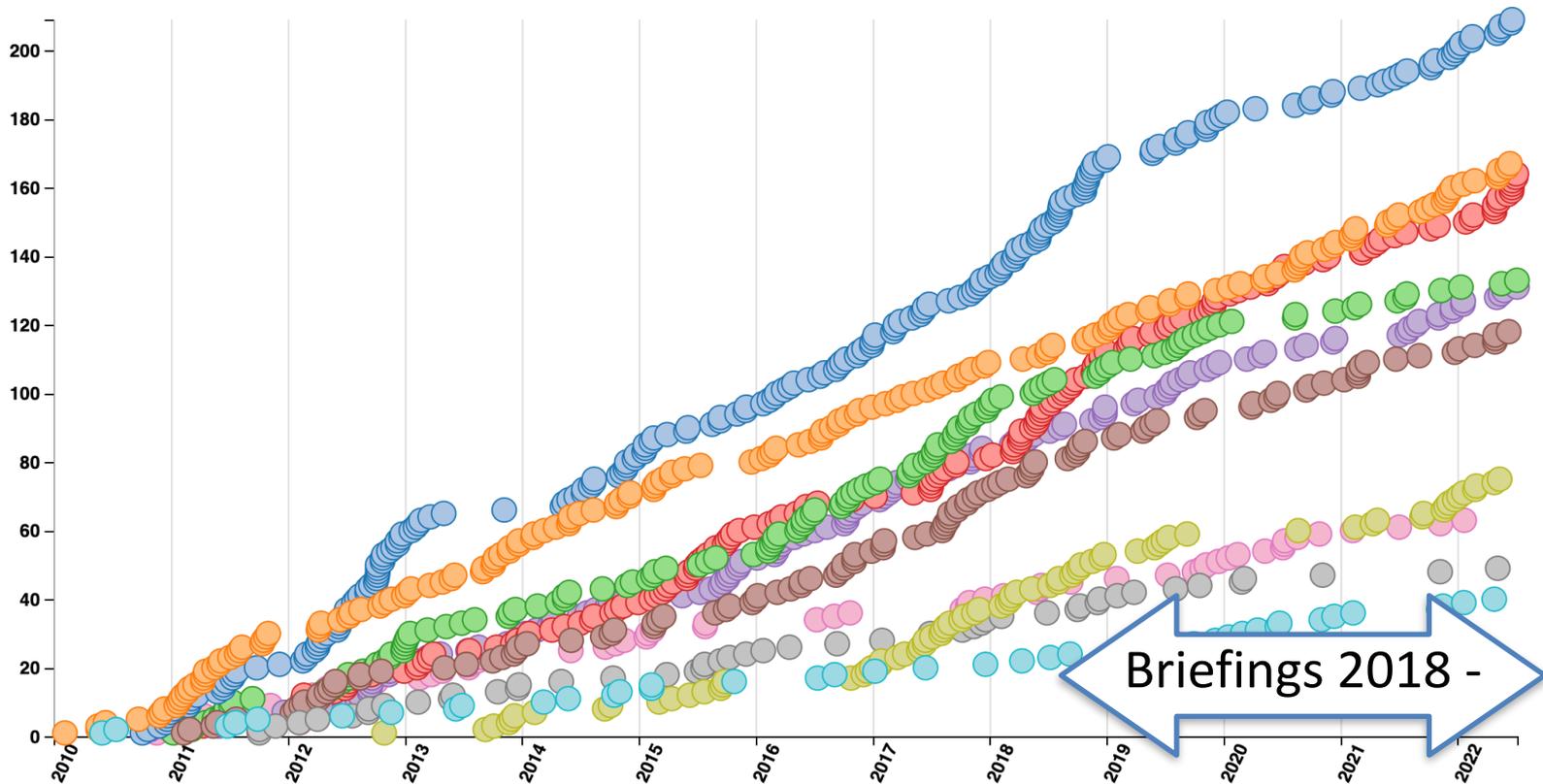
At the bottom left, a graphic shows a globe and the text '這個組織, 平均智商 160+' with a '11:35' duration. A Twitter icon and the name 'freyablekman' are also present.



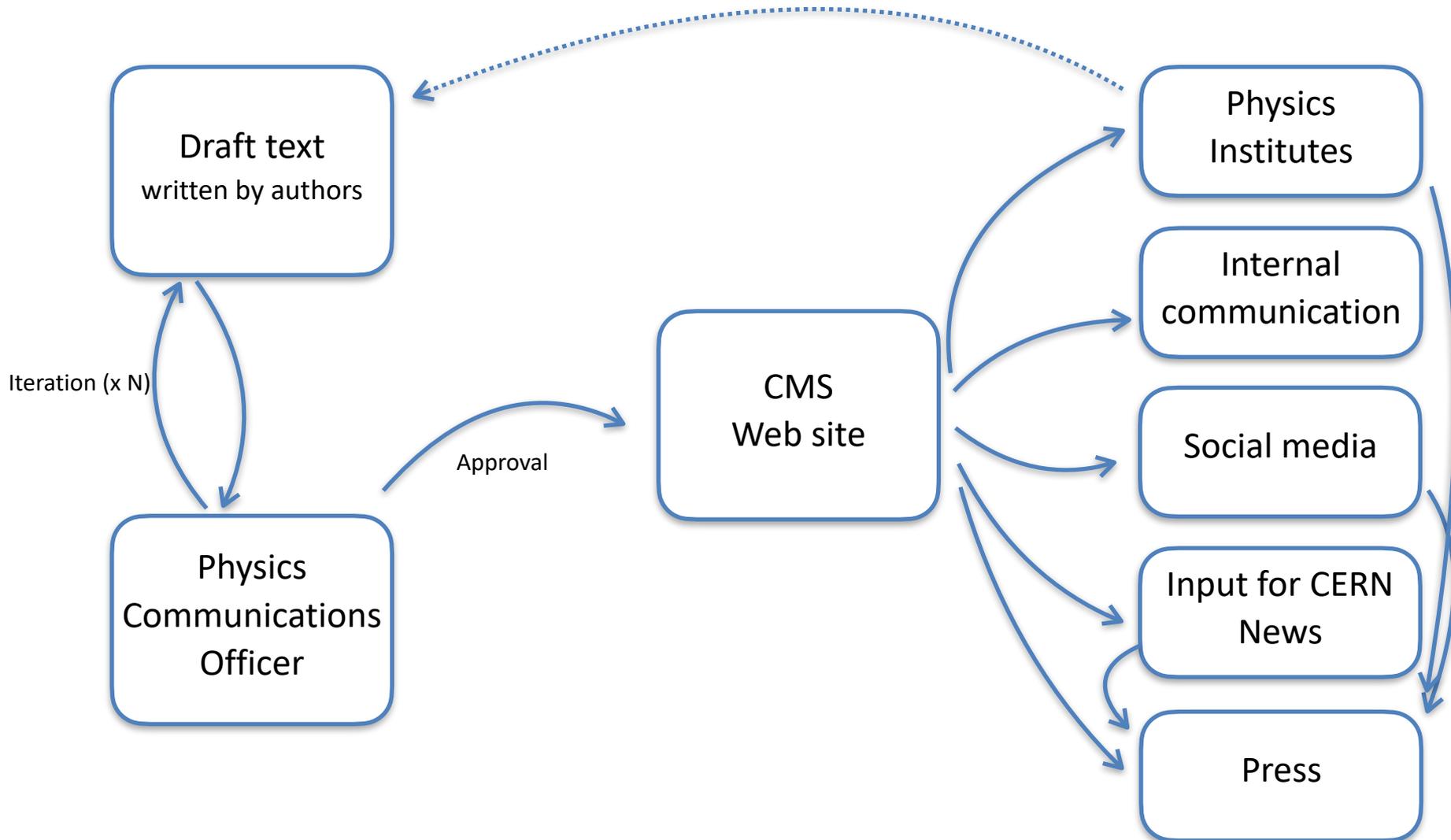
But also

- Show all
- Total
- Exotica
- Standard Model
- Supersymmetry
- Higgs
- Top
- Heavy Ions
- B and Quarkonia
- Forward and Soft QCD
- Beyond 2 Generations
- Detector Performance

1149 collider data papers submitted as of 2022-07-06



Briefings: The plan



Bottom-up: collaboration-sourced texts

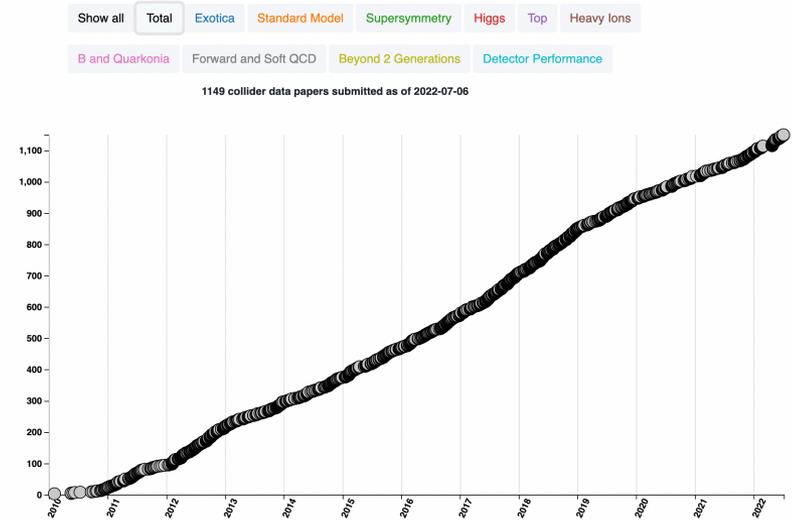
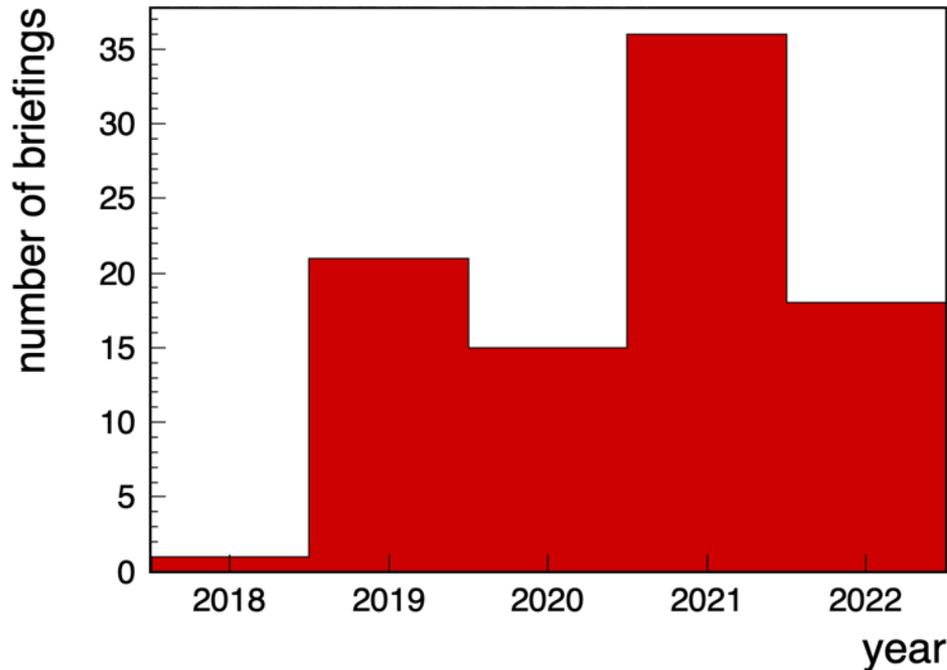


Anyone who wants to write a briefing gets to do so*

First draft (almost) always by authors

*of course for high profile topics we make sure we have a briefing

Briefings: now about 1/3 of papers



Anyone who wants to write a briefing gets to do so*

First draft (almost) always by authors

*of course for high profile topics we make sure we have a briefing

Internal communication

- Diverse physics program means diverse physicists
- Briefings also useful inside collaboration
- Low(er)-threshold way to keep track of CMS results

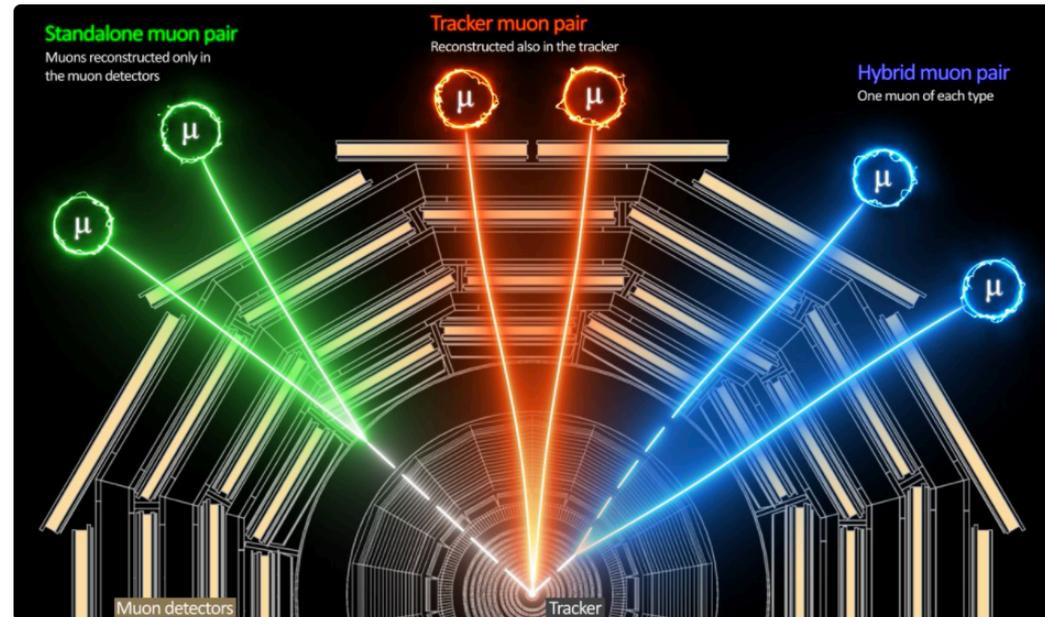


Freya Blekman 6:42 PM

[physics briefing]: In a detector far, far away: searching for elusive long-lived travellers by tracing pairs of muons

A recent CMS result looks for the production of exotic particles decaying away from the beam collision region, creating pairs of muons that appear to not come from the center of the detector.

Read the briefing here: <https://cms.cern/news/detector-far-far-away-searching-elusive-long-lived-travellers-tracing-pairs-muons>



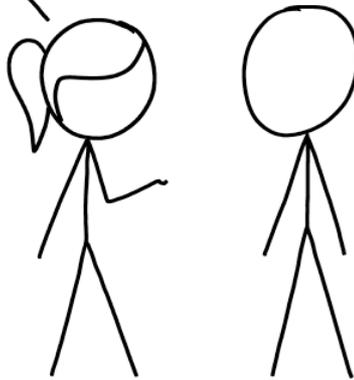
Briefings are posted on CMS internal channels too!



 freyablekman

SILICATE CHEMISTRY IS SECOND NATURE TO US GEOCHEMISTS, SO IT'S EASY TO FORGET THAT THE AVERAGE PERSON PROBABLY ONLY KNOWS THE FORMULAS FOR OLIVINE AND ONE OR TWO FELDSPARS.

OF COURSE.
AND QUARTZ, OF COURSE.



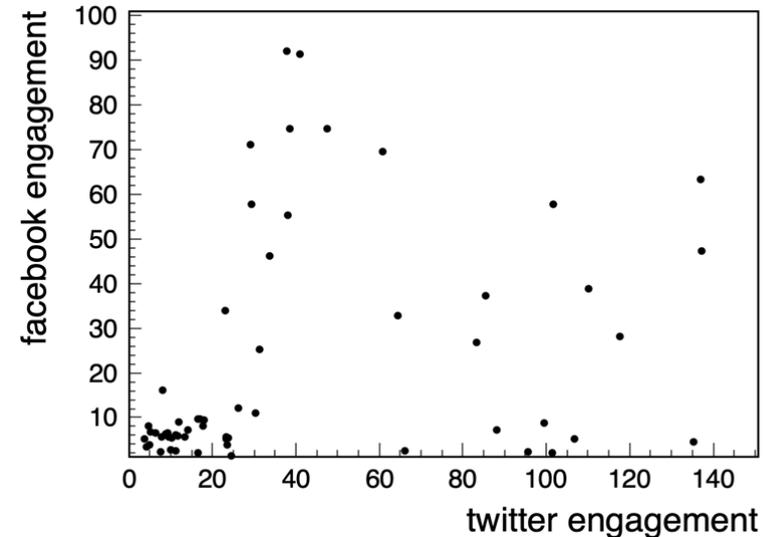
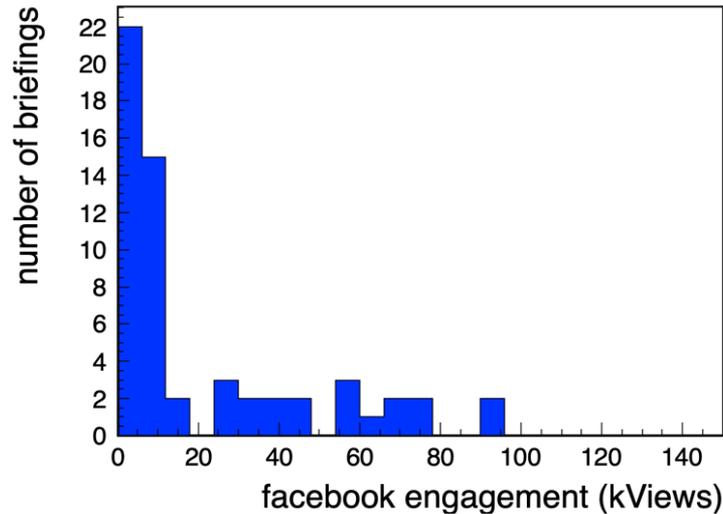
EVEN WHEN THEY'RE TRYING TO COMPENSATE FOR IT, EXPERTS IN ANYTHING WILDLY OVERESTIMATE THE AVERAGE PERSON'S FAMILIARITY WITH THEIR FIELD.

src: xkcd

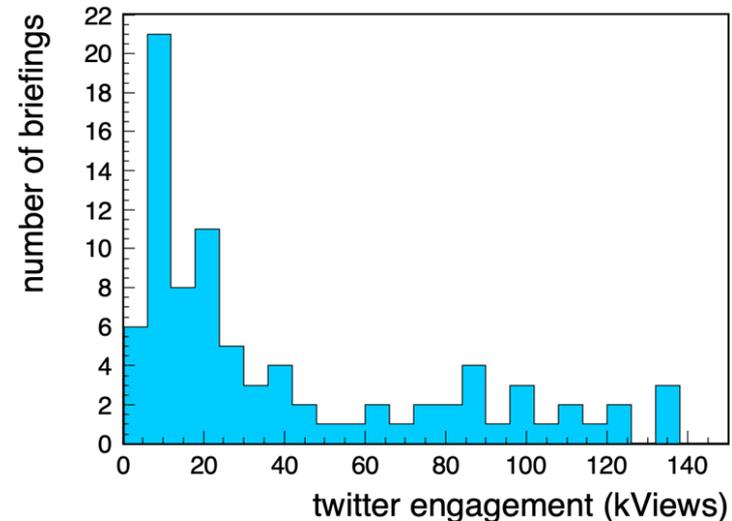


freyablekman

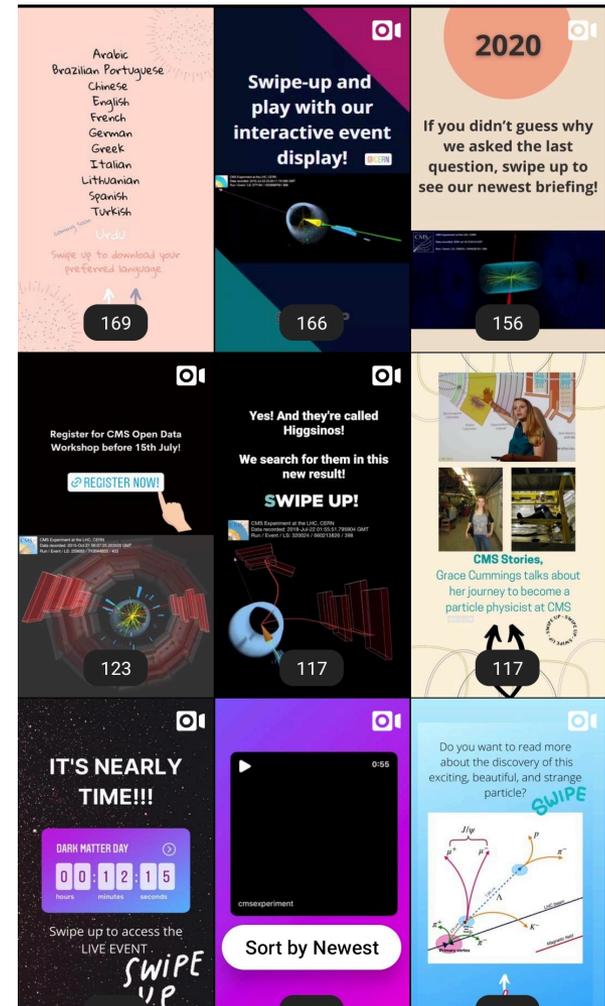
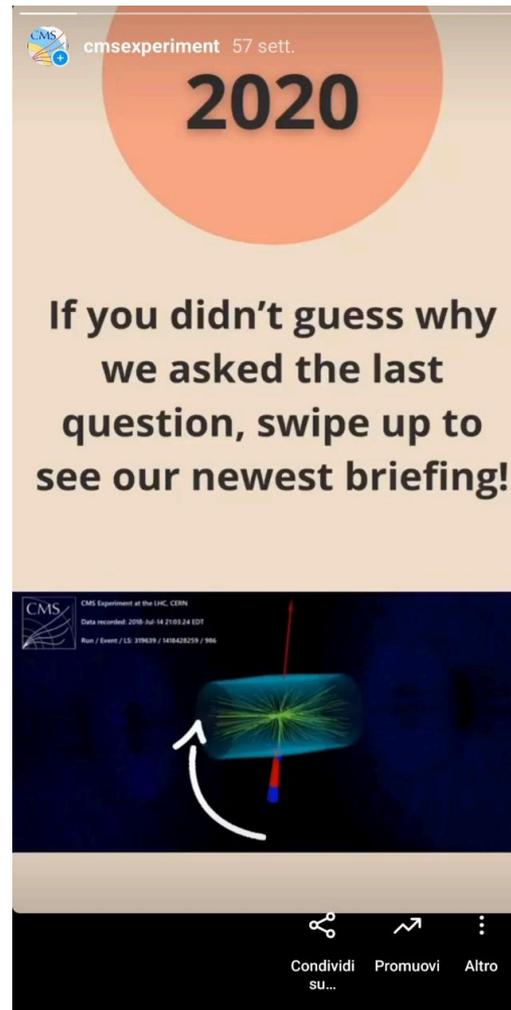
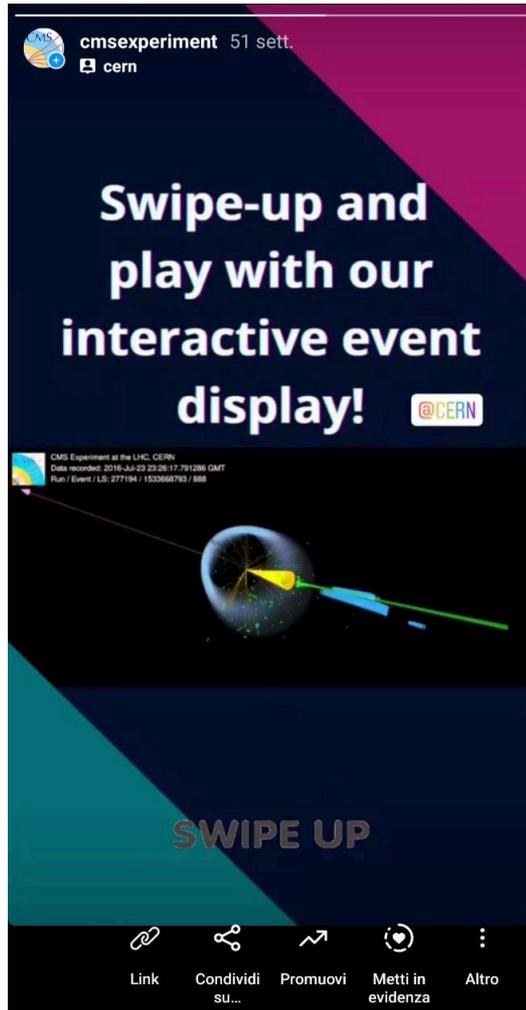
Briefings in social media, analysis



- Correlation between social media networks 30%
- CERN share has huge influence on going viral
 - To be expected, many more followers
 - CERN share decision driven by physics importance but also graphics/quality text
- Reads on web site: consistent at few % of engagement (typical for social media)



And yes of course we are on instagram (And growing)



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“Best in class” (from last 2 years)

(In alphabetical order)

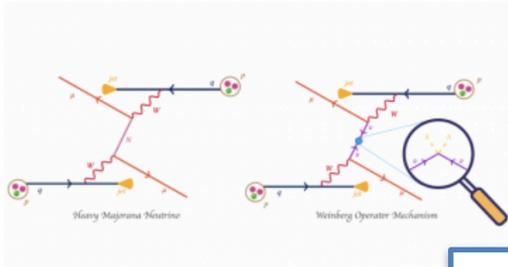
CMS analysis code	Title	Web link
B2G-20-007	TWICE THE HIGGS, TWICE THE FUN!	https://cms.cern/news/twice-higgs-twice-fun
EGM-17-001	FINDING ELECTRONS AND PHOTONS WITH THE CMS DETECTOR	https://cms.cern/news/finding-electrons-and-photons-cms-detector
EXO-20-013	SEARCHING FOR THE DARK SIDE OF THE UNIVERSE	https://cms.cern/news/searching-dark-side-universe
EXO-20-030	LIVE LONG AND PROSPER: SEARCHING FOR THE LONG-LIVED RELATIVES OF THE HIGGS BOSON	https://cms.cern/news/live-long-and-prosper-searching-long-lived-relatives-higgs-boson
HIG-21-013	LIFE OF THE HIGGS BOSON	https://cms.cern/news/life-higgs-boson
HIN-19-001	HEAVY METAL HITS THE TOP	https://cms.cern/news/heavy-metal-hits-top
HIN-21-009	USING LIGHT TO MAKE COUSINS OF THE ELECTRON	https://cms.cern/news/using-light-make-cousins-electron
LUM-17-003	ILLUMINATING! COUNTING LHC COLLISIONS WITH CMS	https://cms.cern/news/illuminating-counting-lhc-collisions-cms
SMP-18-014	A TALE OF TWO COLLIDERS AND THE UNRIVALLED PRECISION ON THE Z INVISIBLE WIDTH	https://cms.cern/news/tale-two-colliders-and-unrivalled-precision-z-invisible-width
SUS-19-004	UNDER THE RADAR: SEARCHING FOR STEALTHY NEW PARTICLES	https://cms.cern/news/under-radar-searching-stealthy-new-particles
TOP-18-012	WHAT DOES THE DECAY OF A BOTTOM QUARK LOOK LIKE?	https://cms.cern/news/what-does-decay-bottom-quark-look

Shared characteristics:

“Fun” titles, animations/video/.gifs and appealing graphics (and event displays) for social media



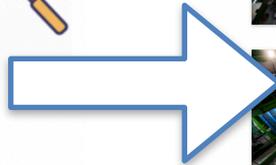
Briefing as source for science communication



TWO ENDS OF A SEESAW 25 APR 2022

Neutrinos (ν) are the most intriguing particles in nature. The evolution in our understanding about the characteristics of the neutrinos is also very interesting. The apparent non-conservation of energy in beta decay led Pauli to predict, in 1933, a...

[READ MORE](#)



CMS on the lookout for new physics

The CMS experiment awaits LHC Run 3 to explore several analyses showing small disagreements with theory expectations

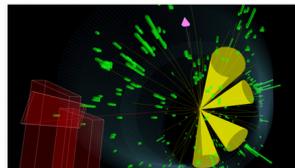
News | Physics | 17 June, 2022



CMS tries out the seesaw

The collaboration has put the seesaw model of neutrino mass to a new test

News | Physics | 04 May, 2022



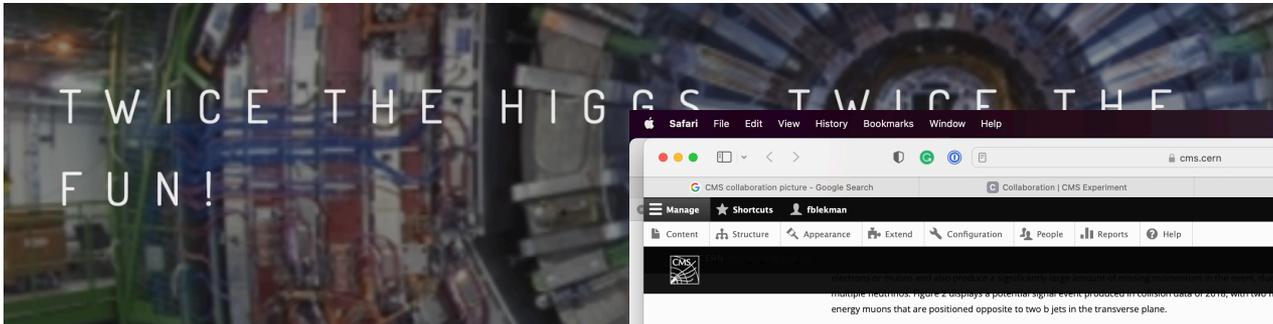
CMS measures the mass of the top quark with unparalleled accuracy

Precise knowledge of the top-quark mass is of paramount importance to understand our world at the smallest scale

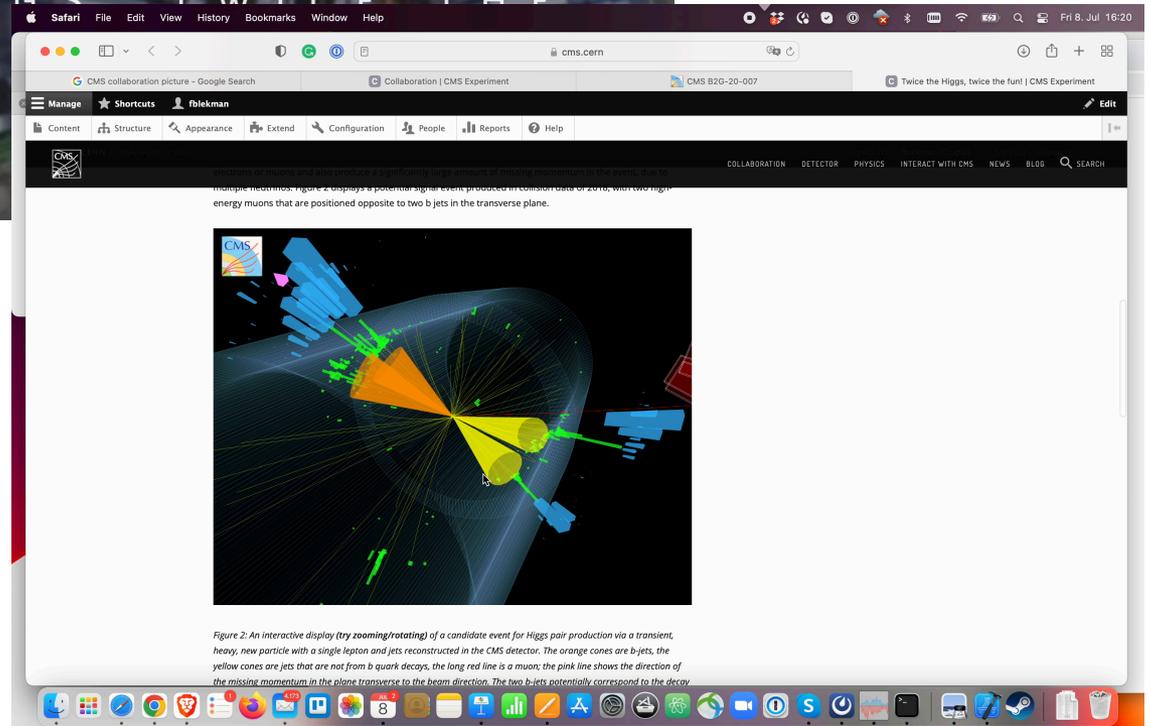
News | Physics | 19 April, 2022

A large fraction of CMS news articles on CERN, FNAL, Symmetry magazine start out as physics briefings

Examples of innovation



Interactive
event displays!

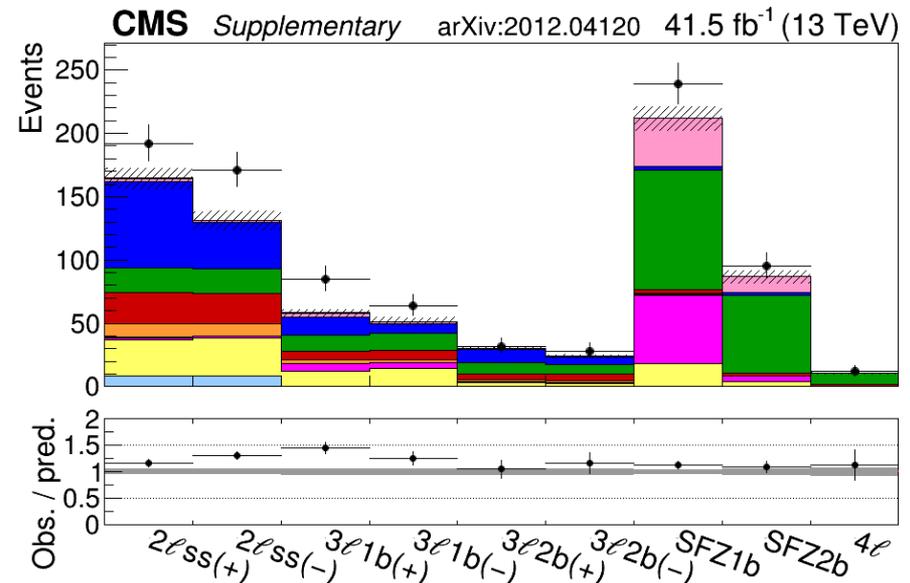
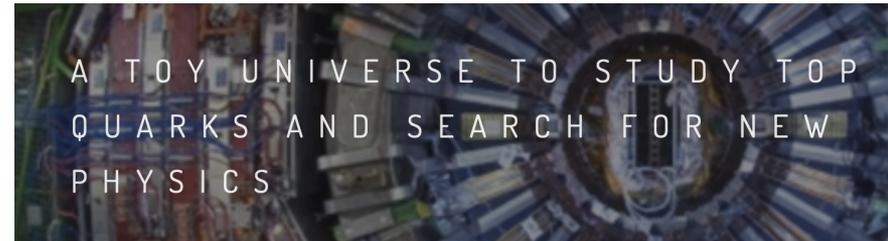
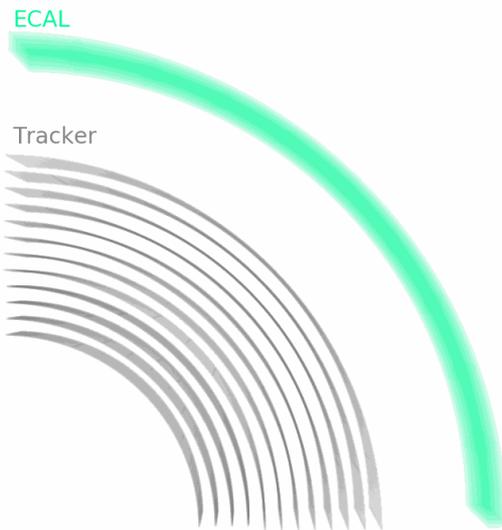


Example: <https://cms3d.web.cern.ch/B2G-20-007/>

Examples of innovation

Many creative uses of animated .gif

- electron
- ⋯ bremsstrahlung photon 1
- ⋯ bremsstrahlung photon 2



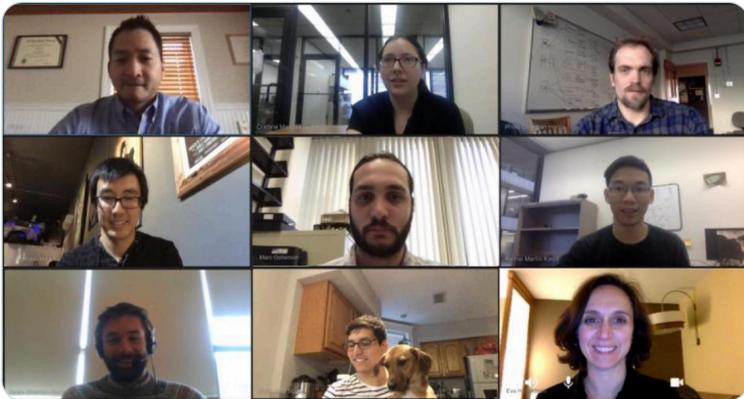
ECR acknowledgement

And many, many more videos on instagram stories



CMS Experiment CERN
@CMSExperiment

CMS results involve a lot of remote collaboration. The [#scientists](#) who worked on the tools to select the jets necessary for the result below (and other similar signatures) met regularly via [#videoconferencing](#). Read more about searching for light bosons: cms.cern/news/casting-l...



2:41 pm · 10 Apr 2019 · Hootsuite Inc.



CMS Experiment CERN
@CMSExperiment

[CMS Physics Briefing]: CMS physicist Dr Rajdeep Chatterjee talks about what it is like to measure the mass of the Higgs boson to the precision of 0.1%! cms.cern/news/cms-prec...

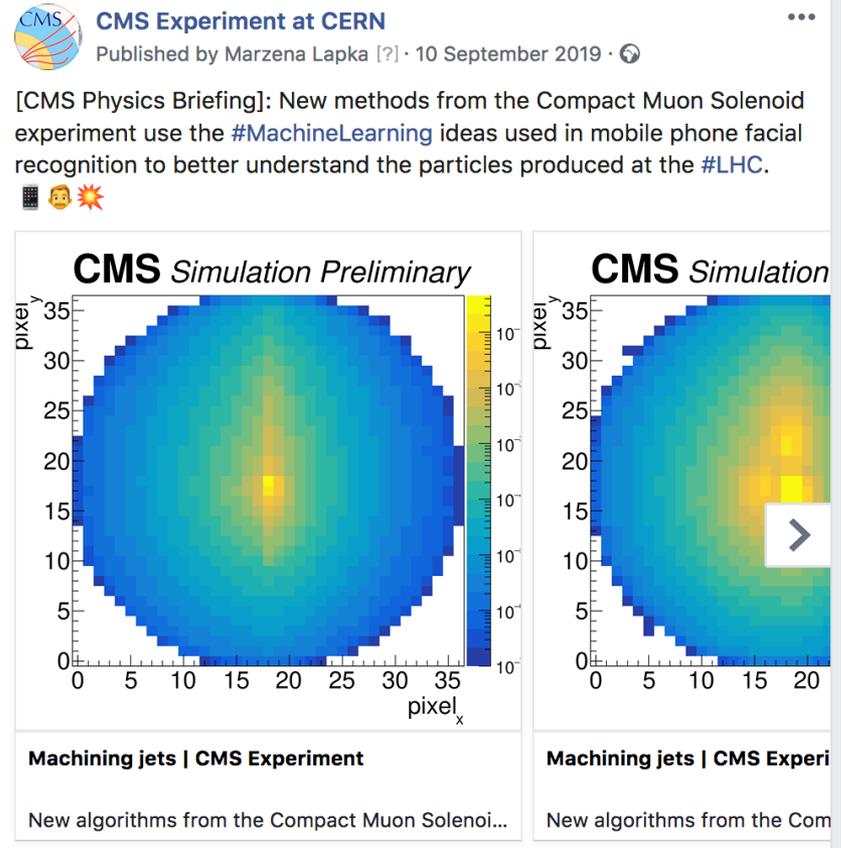


10:30 am · 21 Oct 2019 · Twitter Web App

Conclusions

To reach the technically-inclined general public is not so different from reaching other scientists - but some things count more:

- Have great appealing pictures!
- Event displays! Videos!
- Catchy title that sparks curiosity!
- Always talk about why the result is important
 - that is more important than the really technical difficult work needed to do to get there
- Focus on the take-home message of the science



CMS Experiment at CERN
Published by Marzena Lapka [?] · 10 September 2019 · 🌐

[CMS Physics Briefing]: New methods from the Compact Muon Solenoid experiment use the [#MachineLearning](#) ideas used in mobile phone facial recognition to better understand the particles produced at the [#LHC](#).
📱👤🌟

CMS Simulation Preliminary
pixel_y 35 30 25 20 15 10 5 0
0 5 10 15 20 25 30 35 pixel_x

CMS Simulation
pixel_y 35 30 25 20 15 10 5 0
0 5 10 15 20 pixel_x

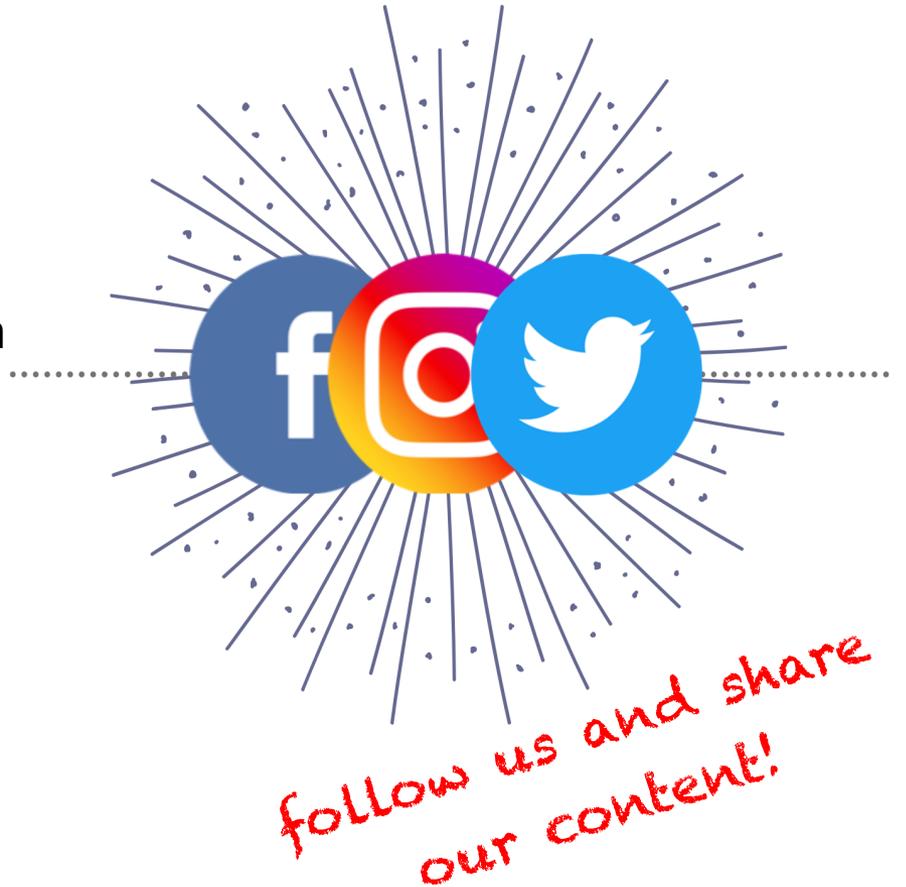
Machining jets | CMS Experiment
New algorithms from the Compact Muon Solenoi...

Machining jets | CMS Experi
New algorithms from the Com

Thank you

CMS Physics Briefings

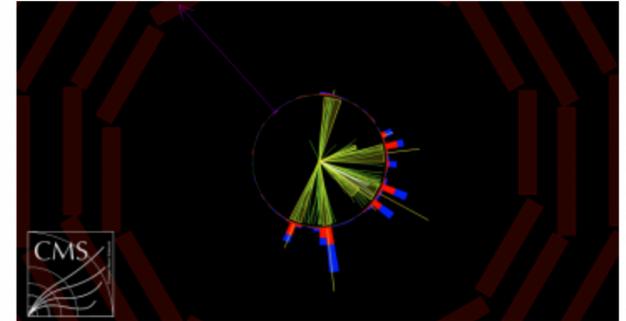
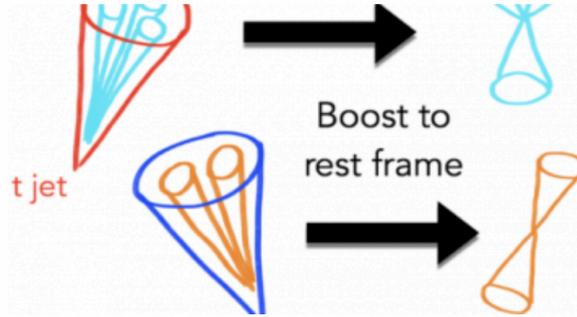
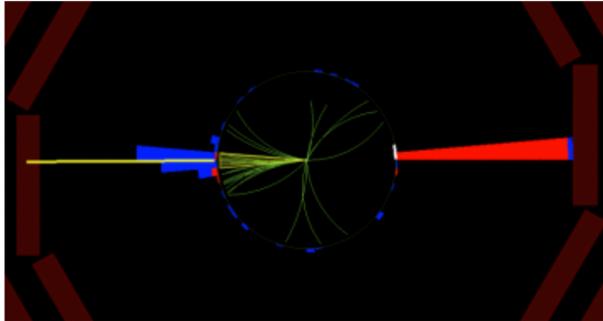
- Target audience: (non-hep)scientists, journalists, funding agency, science-knowledgable general public
- Crowd sourced by collaboration
 - Innovation by young scientists as far as science communication (.gifs, videos, event displays)
 - Experience for young scientists, learn how to write accessible texts
- about 1/3 CMS papers now has one
- using social media to advertise
- great source for science communication aimed at more general audiences (and fruitful collaboration with CERN, labs, etc)



Backup



Early example: “Quarks, the next generation”



CASTING LIGHT ON THE DARK SECTOR

05 APR 2019

There is copious astrophysical and cosmological evidence for dark matter, but no indication of how it was produced, how it interacts with regular matter, or how it could fit into an inclusive model of particle physics. One possibility is that dark...

[READ MORE](#)

NEW FOR MORIOND: QUARKS: THE NEXT GENERATION?

26 MAR 2019

Since the discoveries of the third generation of quarks and leptons starting in the 1970s, physicists have asked the natural question "Can there be more generations?". One of the first key results from the Large Electron Positron collider LEP...

[READ MORE](#)

NEW FOR MORIOND: CATCHING DISAPPEARING PARTICLES

26 MAR 2019

Over the past century, physicists have developed a theory governing the fundamental interactions of elementary particles, known as the Standard Model of Particle Physics. Thus far, it has stood up to many experimental tests with an extraordinary...

[READ MORE](#)



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1/21/22

27

Early example: "Quarks, the next generation"

Search for pair production of vectorlike quarks in the fully hadronic final state

CMS Collaboration • Albert M Sirunyan (Yerevan Phys. Inst.) [Show All\(2338\)](#)

Jun 27, 2019

30 pages

Published in: *Phys.Rev.D* 100 (2019) 7, 072001

Published: Oct 9, 2019

e-Print: [1906.11903](#) [hep-ex]

DOI: [10.1103/PhysRevD.100.072001](#) (publication)

Report number: CMS-B2G-18-005, CERN-EP-2019-129

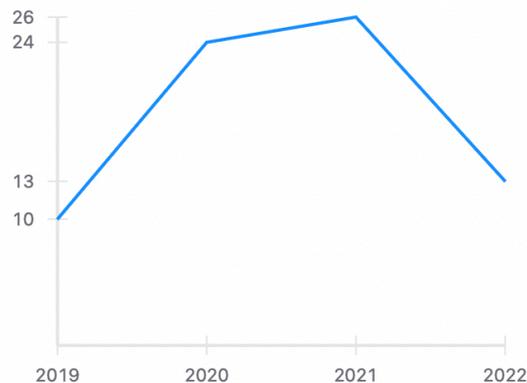
Experiments: [CERN-LHC-CMS](#)

View in: [OSTI Information Bridge Server](#), [HAL Archives Ouvertes](#), [CERN Document Server](#), [ADS Abstract Service](#)

 pdf  cite  **CMS Experiment CERN** @CMSExperiment · Mar 29 7,866
[CMS physics summary]: Leaving no stone unturned in when searching for #supersymmetry, also when it shows as particles disappearing halfway in the CMS detector. One of the over 37 new CMS results for #Moriond !
[cms.cern/news/new-morio...](#) [cms.cern/news/delayed-j...](#)
[View Tweet activity](#)

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