

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?

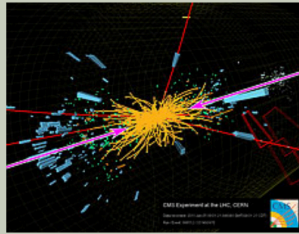
- CMS papers tweet
 - There is an automatic bot that tweets any PAS or paper
 - Including animated .gif of all figures in paper!
- More relevant for communication to scientists in the field
- Also: [searchable papers on web site](#)



October 28, 2011

Fermilab Today

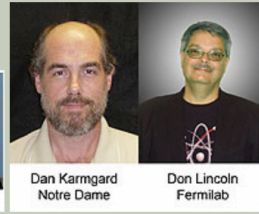
The quarks that miss



Giuseppe Cerati
UC San Diego

Rick Field
U. Florida

Mohammed Zakaria
U. Florida

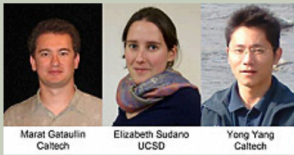


Dan Karmgard
Notre Dame

Don Lincoln
Fermilab

October 14, 2011

Lepton fizz



Marat Gataulin
Caltech

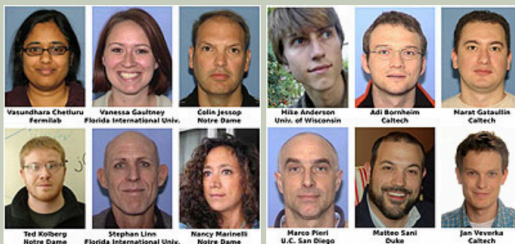
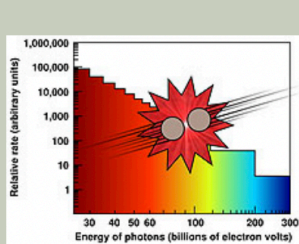
Elizabeth Sudano
UCSD

Yong Yang
Caltech



September 23, 2011

The color of collisions



Vinodhara Chelluri
Fermilab

Vanessa Gaulme
Florida International Univ.

Colla Jaseop
Notre Dame

Mike Anderson
Univ. of Wisconsin

Adi Bornheim
Caltech

Marat Gataulin
Caltech

Ted Kollberg
Notre Dame

Stephan Linn
Florida International Univ.

Nancy Marinelli
Notre Dame

Marco Pizzi
U.C. San Diego

Matteo Sani
Duke

Jan Veverka
Caltech

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

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



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

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](#)

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)

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.

Submitted by:

D. Stickland

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

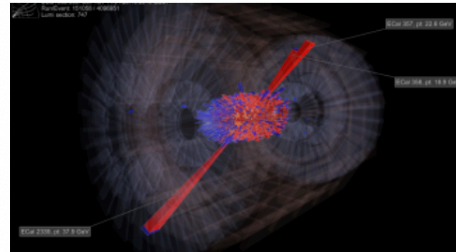
<https://cds.cern.ch/record/979798?ln=en>



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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

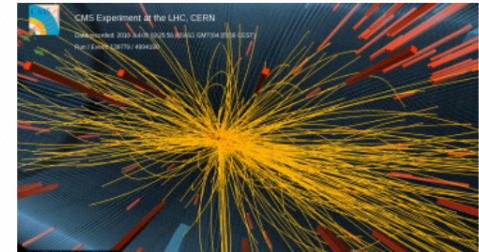


FIRST Z BOSONS DETECTED BY CMS IN HEAVY-ION COLLISIONS

🕒 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](#)

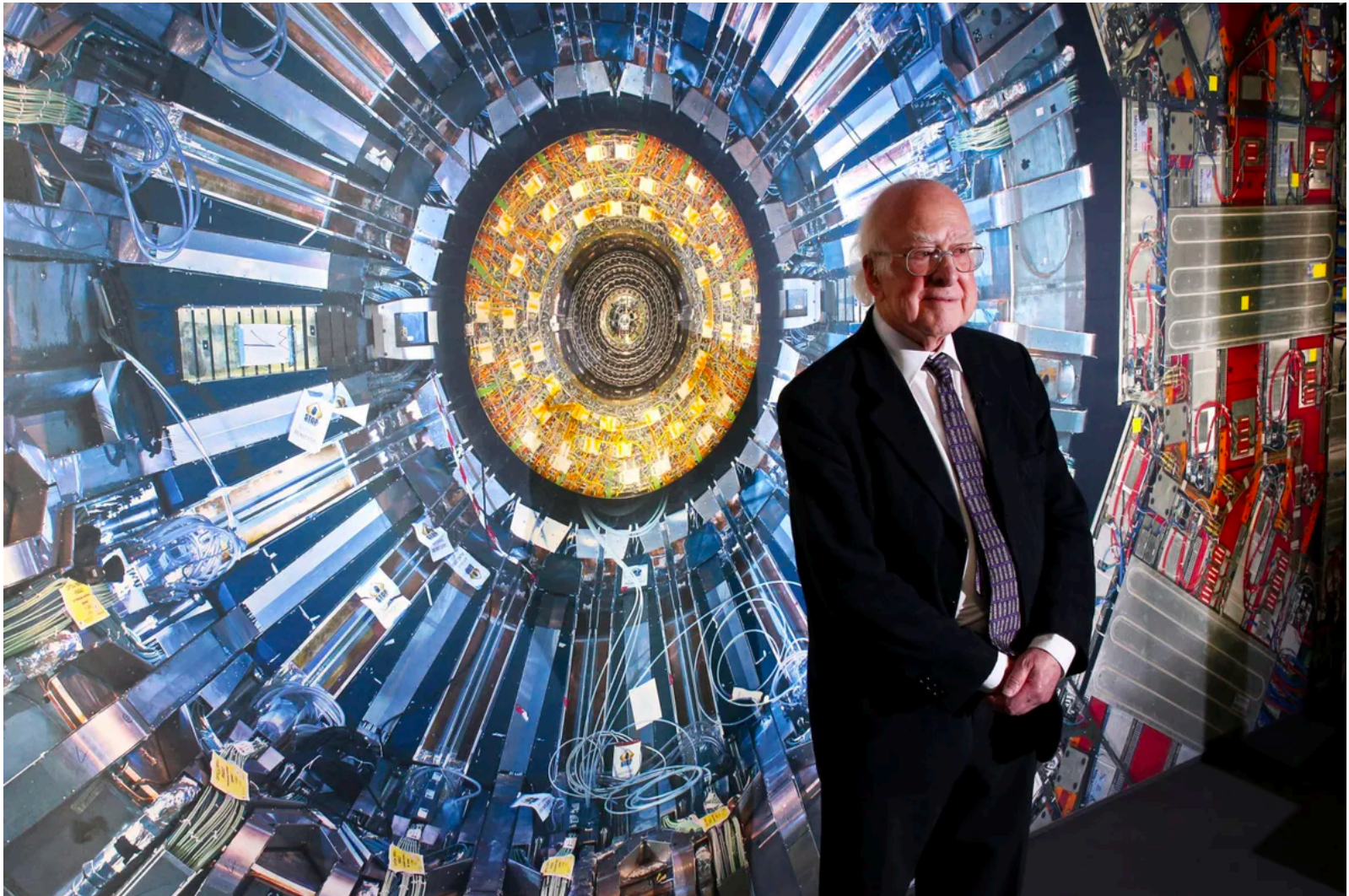


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What changed?



What changed?



What changed?

YouTube

CH

CERN

SIGN IN

Large Hadron Rap
alpinekat • 8.1M views • 11 years ago
Rappin' about CERN's Large Hadron Collider! Links below... Apparently YouTube fixed the sound! Still, Will Barras made two ...
and the things that it discover 4:49

I'm a Physicist At CERN We've Done Something We Shouldn't Have Done part one
Paranoid Times • 6.5M views • 4 years ago
If you like my videos and want to support more content on my heavily censored, demonetized channel: * Patreon: ...
CC

The CERN black hole
BrainReleaseValve • 5.3M views • 12 years ago
<http://www.brainreleasevalve.com/> Stolen from Misunderstood Universe. Because its HILARIOUS. Yes, I know this can't happen.
0:38

Robin and The Backstabbers - Sat dupa Sat (CERN campaign)
TheLunoStudio • 4.7M views • 5 years ago
Sat după sat " e parte a campaniei "România la CERN în 2015" dezvoltată de Luno. Regia: Andrei Fântână DoP: Alex Grigoraș ...
4K 3D 2:48

Why This Stuff Costs \$2700 Trillion Per Gram - Antimatter at CERN
Physics Girl • 3.1M views • 8 months ago
Physics Girl is on Patreon! => <https://www.patreon.com/physicsgirl> There's a factory in Europe that makes antimatter! It's the ...
11:30

這個組織, 平均智商

160+

11:35

一個平均智商超過160的組織每天都在幹什麼, CERN | 老高與小茉 Mr & Mrs Gao
老高與小茉 Mr & Mrs Gao • 3M views • 1 year ago
地球上有一樣一個組織, 他的成員平均智商都在160以上, 他的實驗有可能創造宇宙。 ————— 相關鏈接: ...

SACRIFICIO HUMANO EN EL CERN
9:12

Anonymous - Everyone Needs to Pay Attention to This! (CERN ALERT MESSAGE 2017-2018)
Anonymous Official • 2.3M views • 2 years ago
Anonymous - Everyone Needs to Pay Attention to This! (CERN ALERT MESSAGE 2017-2018) JOIN US: <https://goo.gl/2mQal0> ...

Scientist and the Elite Try to Hide What Really Happened at CERN, Demonic Entities, Extra Dimensions
A & Q Productions • 2.1M views • 1 year ago
Scientist are beginning to get more and more "religious". What has happened at CERN the past few Years? And What are they up ...
CC 35:32

Step inside the Large Hadron Collider (360 video) - BBC News
BBC News • 1.4M views • 4 years ago
A 360 tour of CERN that takes you deep inside the Large Hadron Collider – the world's greatest physics experiment - with BBC ...
4K 360° 3:15

Cern - The Message (Magdelayna's Apollo Mix)
Magdelayna • 1.4M views • 5 years ago
Please Subscribe to my channel for more sounds like this! My new Artist Album is available here ...

CERN - 宇宙を破壊するやばすぎる実験なのか? (下ネタあり)
Naokiman Show • 1.3M views • 2 years ago
ツイッターを開いたのでフォローよろしくお願いします! <https://twitter.com/naokimanshow>
CERN - 宇宙を破壊するやばすぎる実験なのか ...
子供の怖すぎるおもちゃ 7:46

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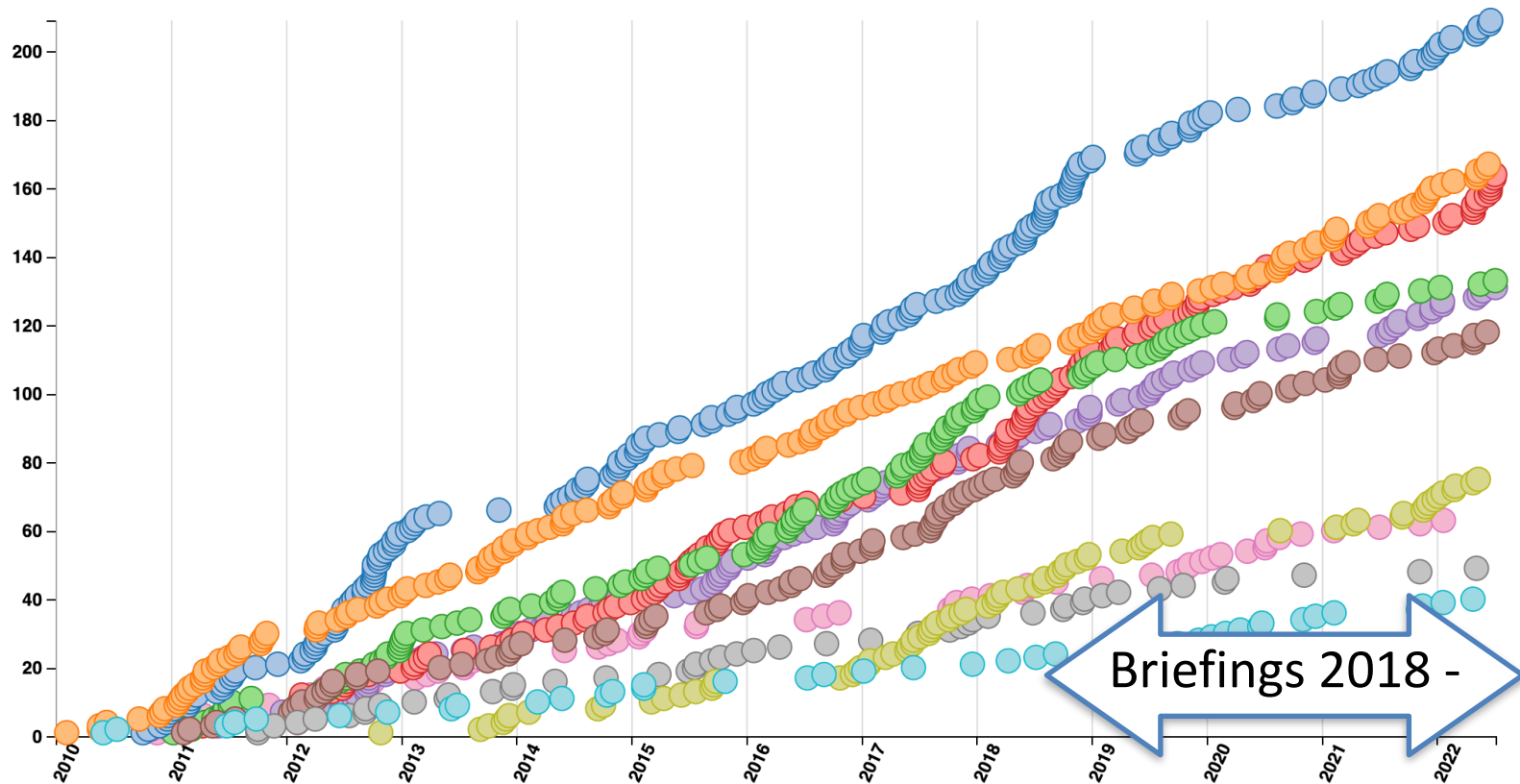
10

But also

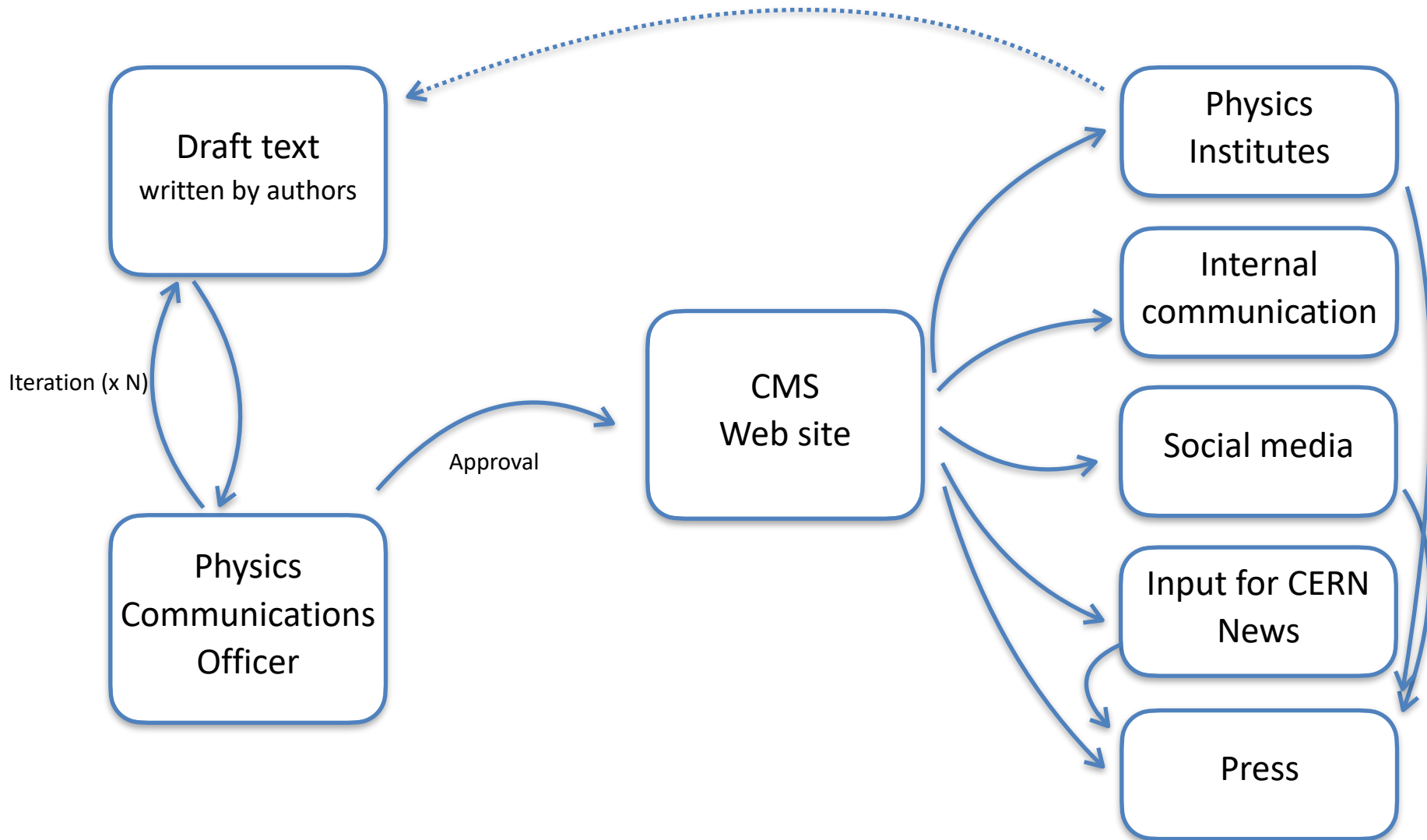
Show all Total Exotica Standard Model Supersymmetry Higgs Top Heavy Ions

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

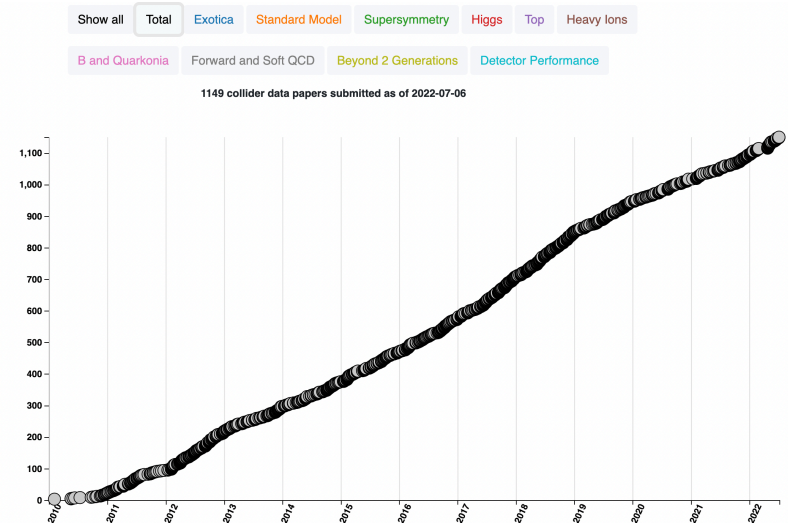
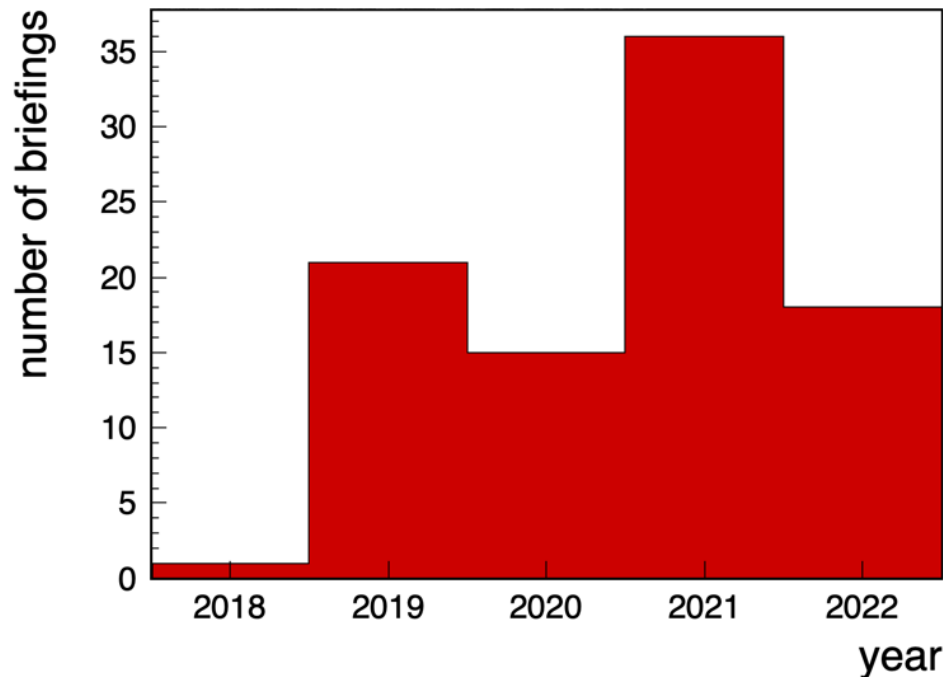


Anyone who wants to write a briefing gets to do so*

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

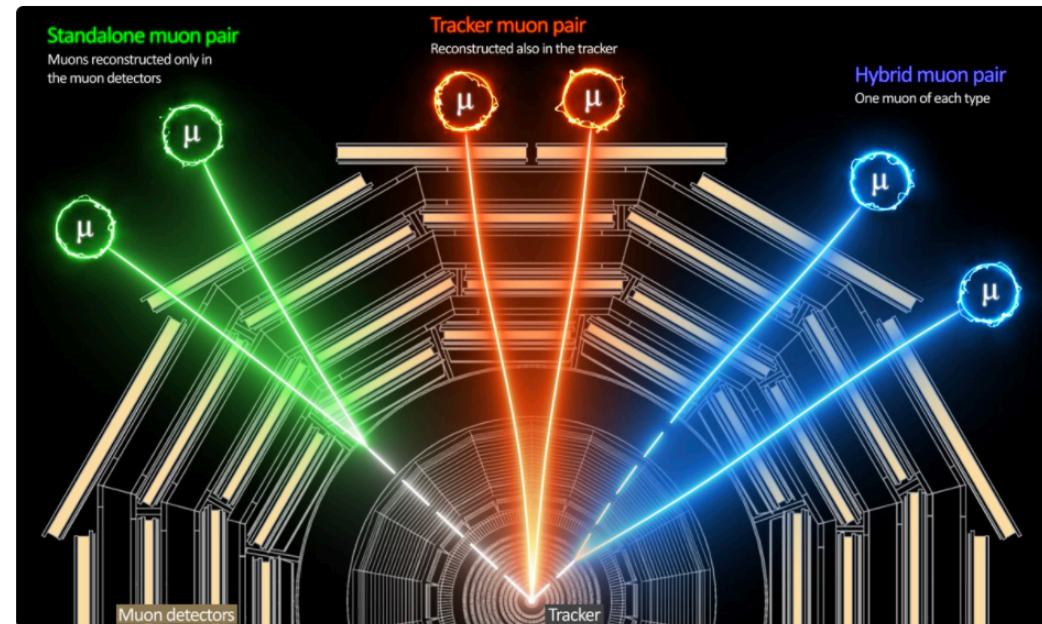


Freya Blekman 6:42 PM

[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>



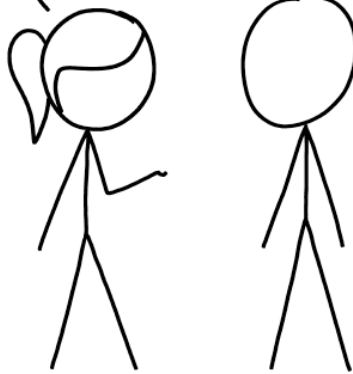
Briefings are posted on CMS internal channels too!



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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.

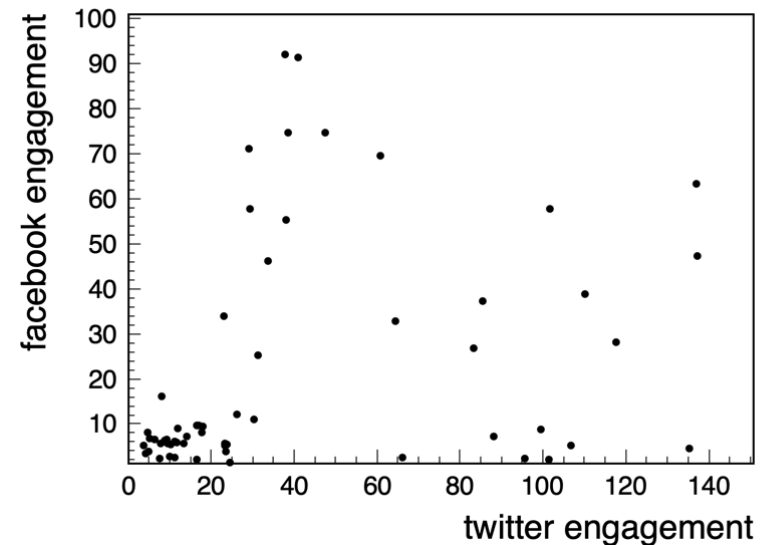
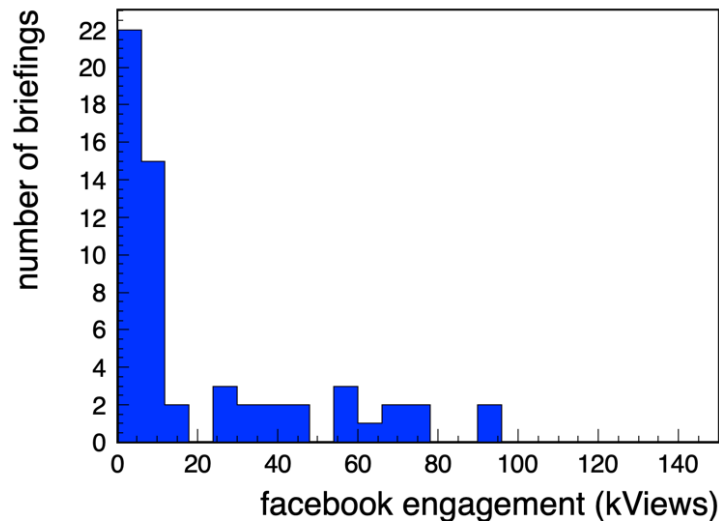
OF COURSE.
AND QUARTZ, OF COURSE.



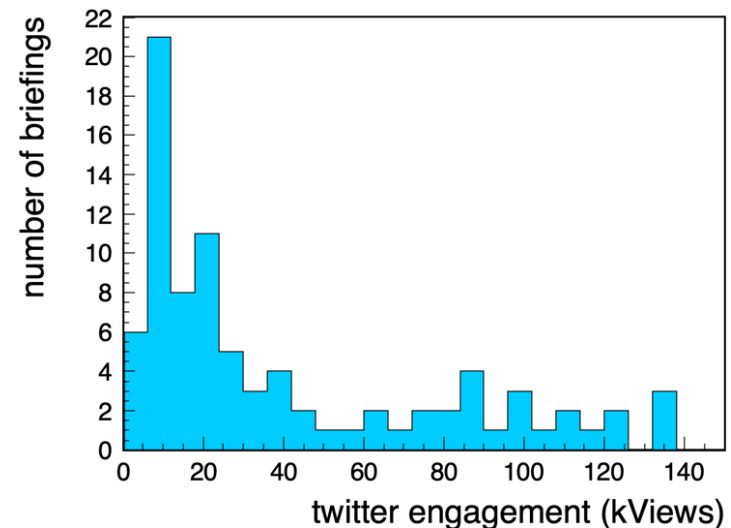
EVEN WHEN THEY'RE TRYING TO COMPENSATE FOR IT, EXPERTS IN ANYTHING WILDLY OVERESTIMATE THE AVERAGE PERSON'S FAMILIARITY WITH THEIR FIELD.

src: xkcd

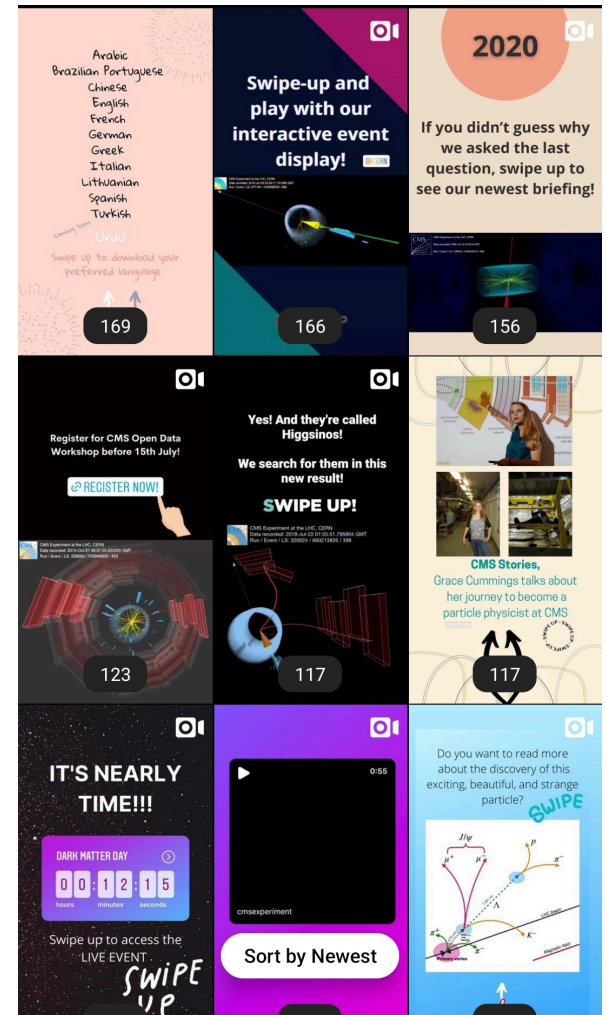
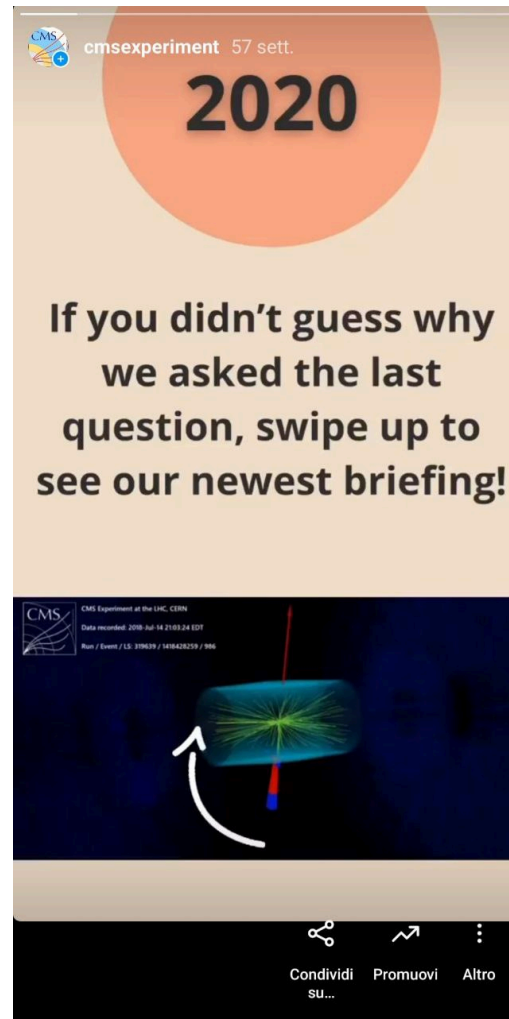
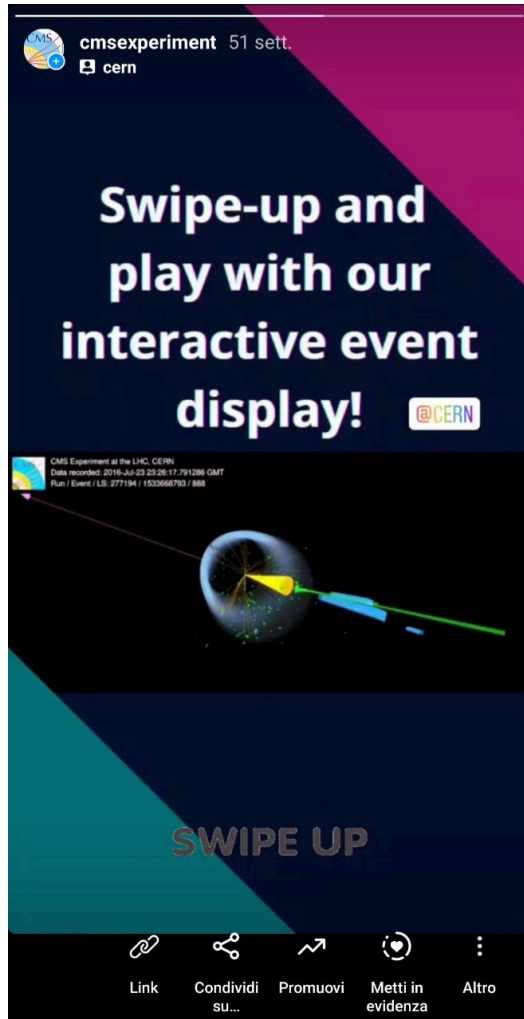
Briefings in social media, analysis



- 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)



“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

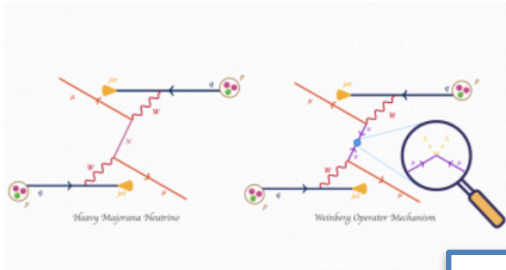
Shared characteristics:

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



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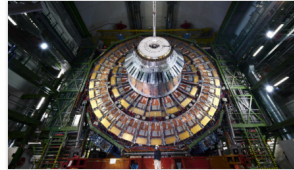
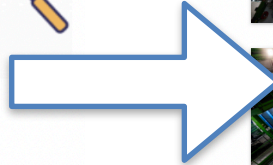
Briefing as source for science communication



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...

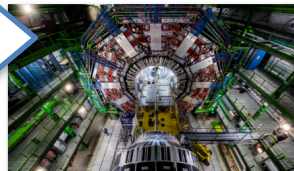
[READ MORE](#)



CMS on the lookout for new physics

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

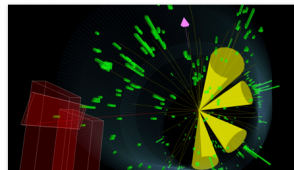
News | Physics | 17 June, 2022



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

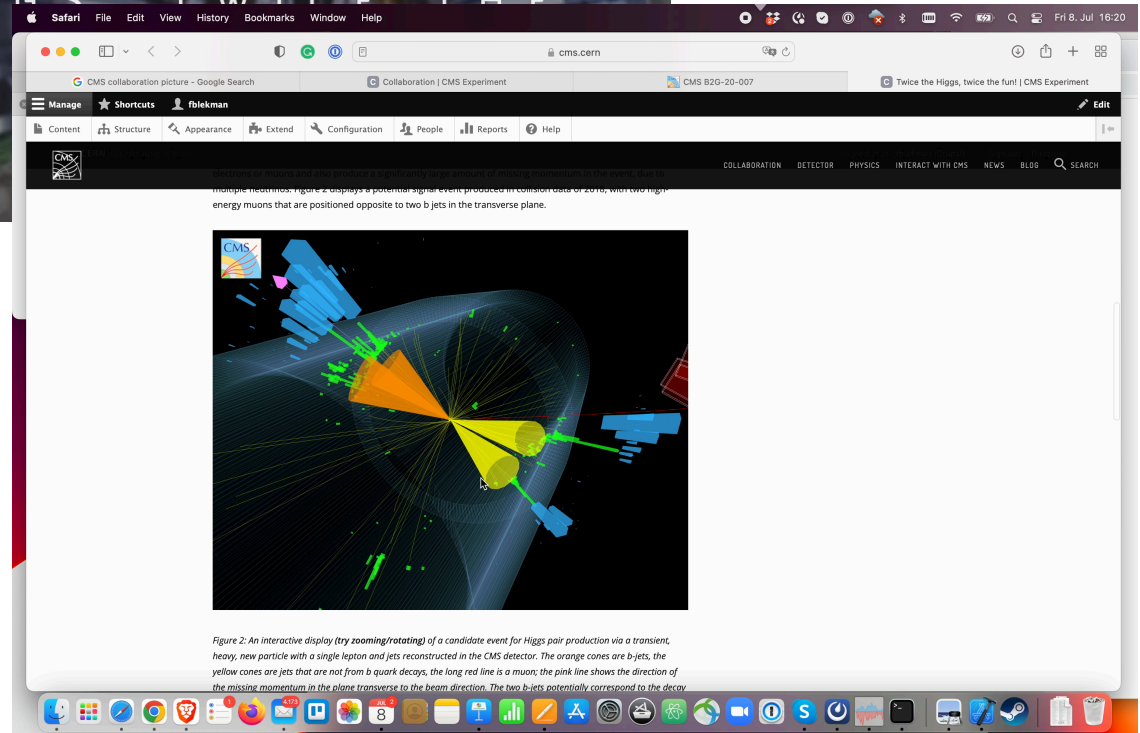
News | Physics | 19 April, 2022

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

Examples of innovation



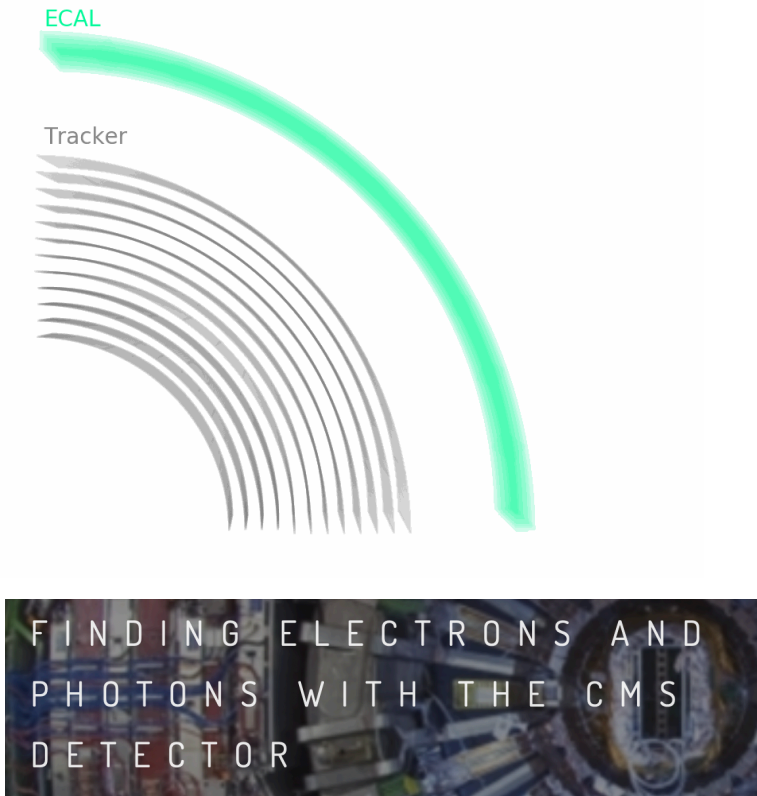
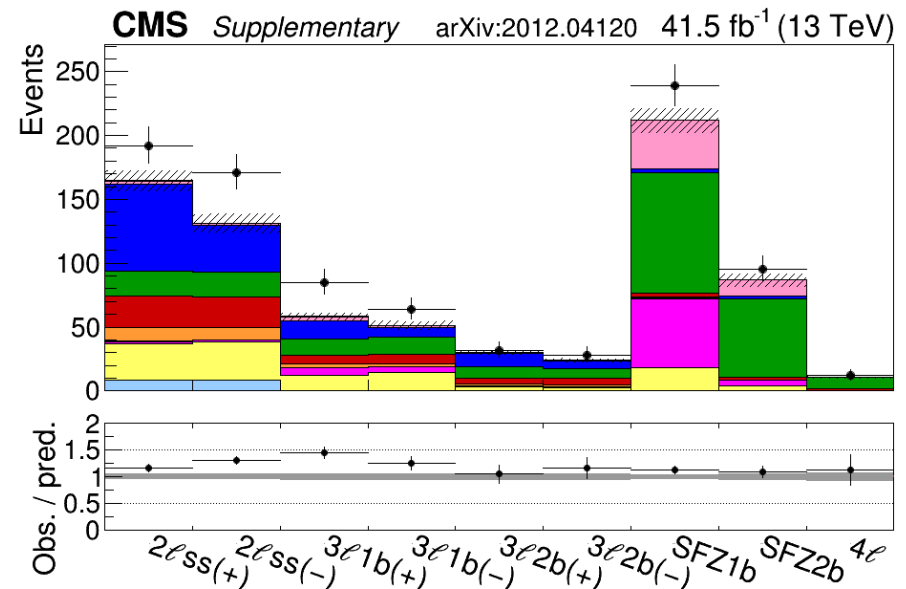
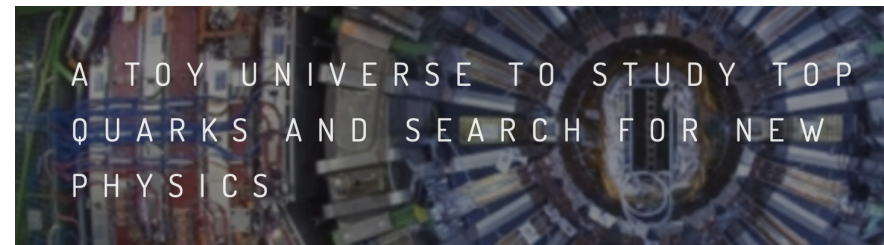
Interactive
event displays!



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

Examples of innovation

Many creative
uses of animated .gif



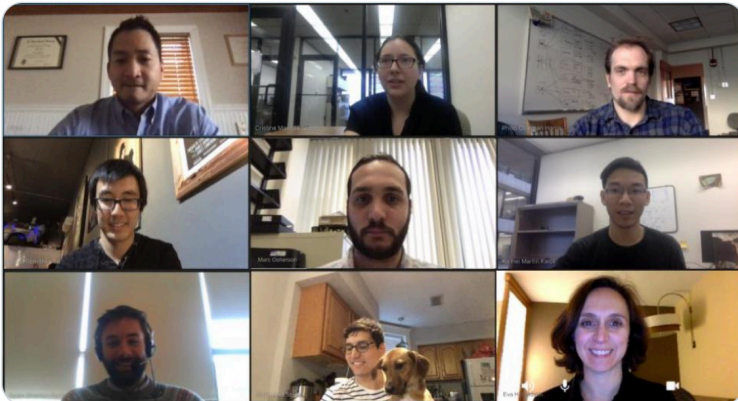
ECR acknowledgement

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...](#)

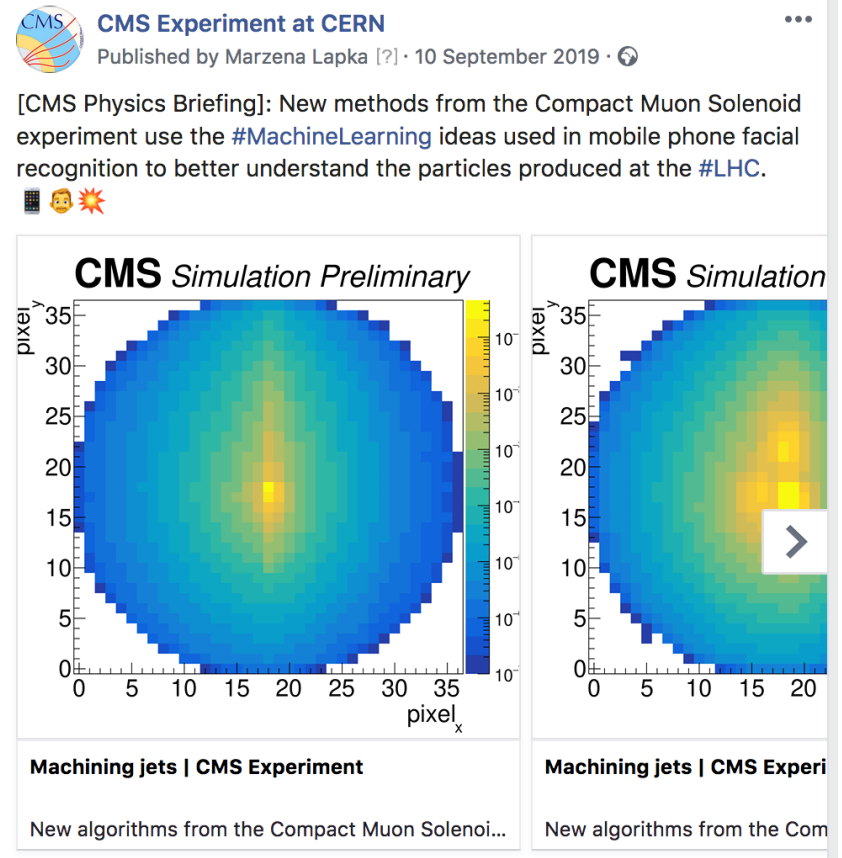


10:30 am · 21 Oct 2019 · Twitter Web App

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



Thank you

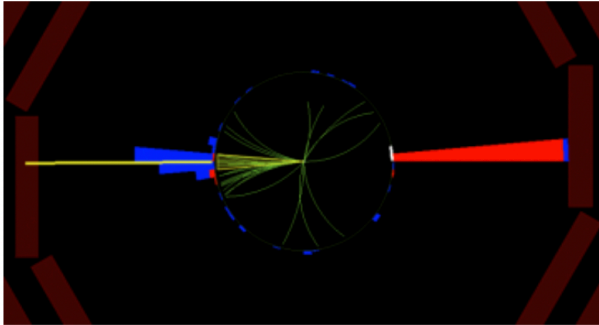
CMS Physics Briefings

- 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”

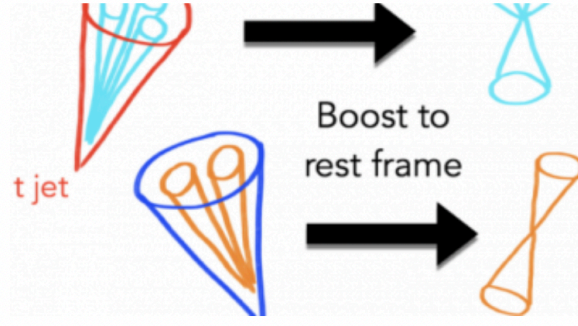


CASTING LIGHT ON THE DARK SECTOR

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](#)

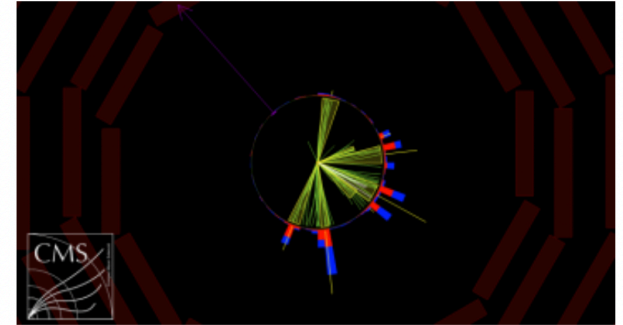


NEW FOR MORIOND: QUARKS: THE NEXT GENERATION?

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](#)

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
[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...](#)

7,866

 73 citations

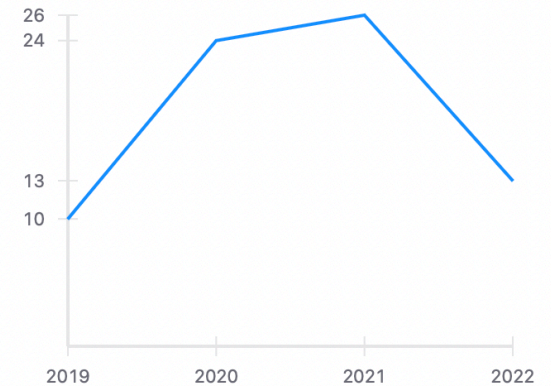
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[pic.twitter.com/9dpFJ1TcwC](#)

59,345

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7,078

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