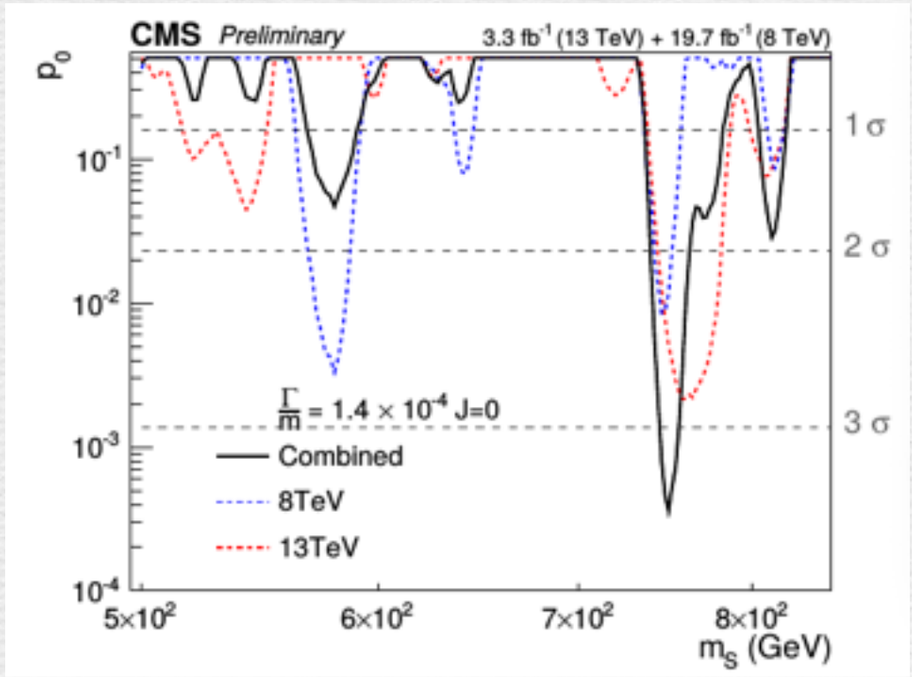
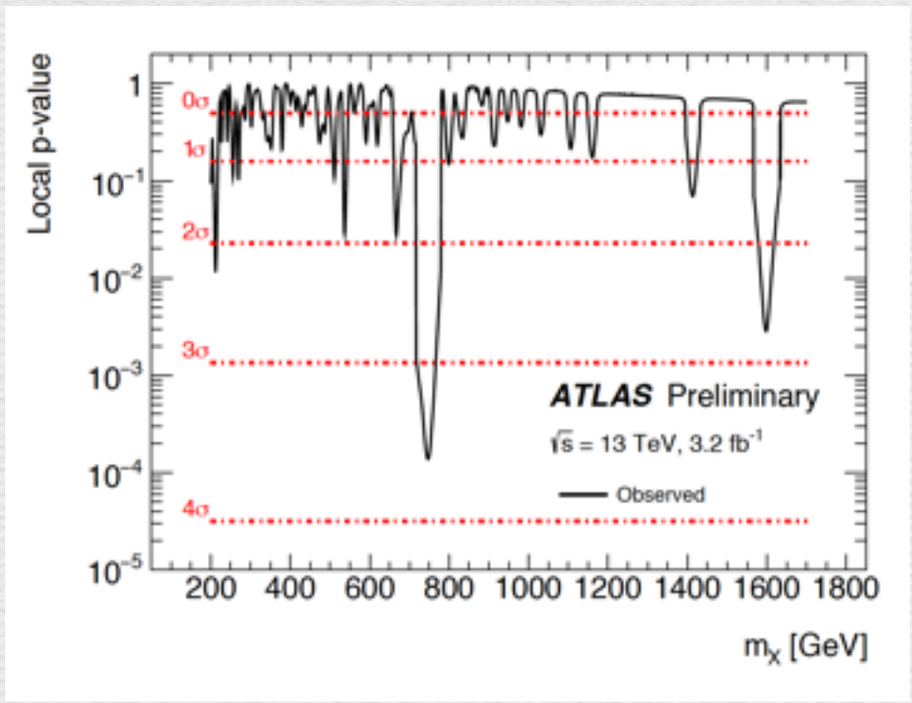
X(750): lessons learnt

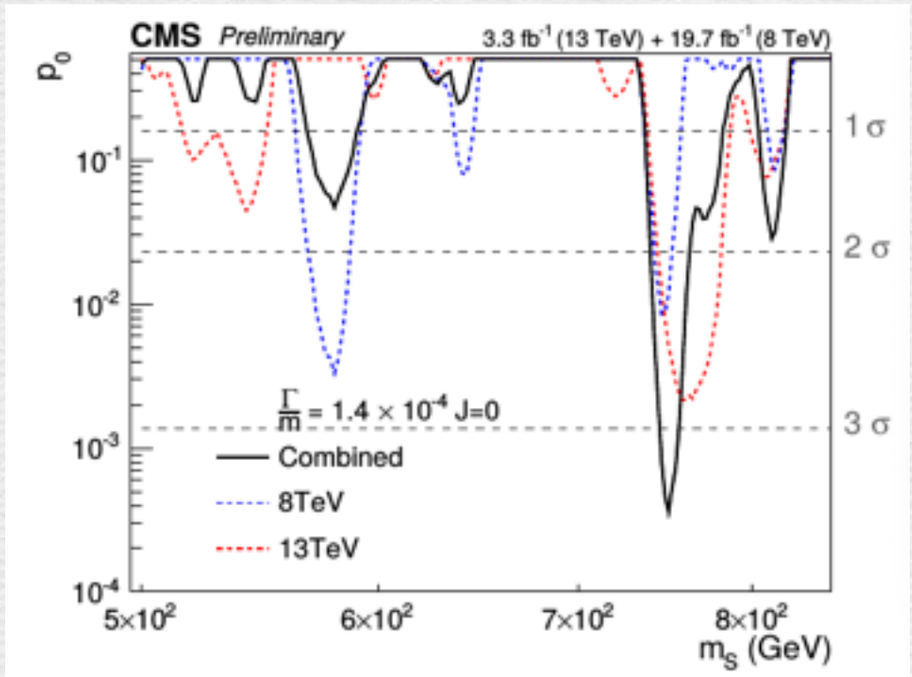
Veronica Sanz (Sussex)

The diphoton surprise

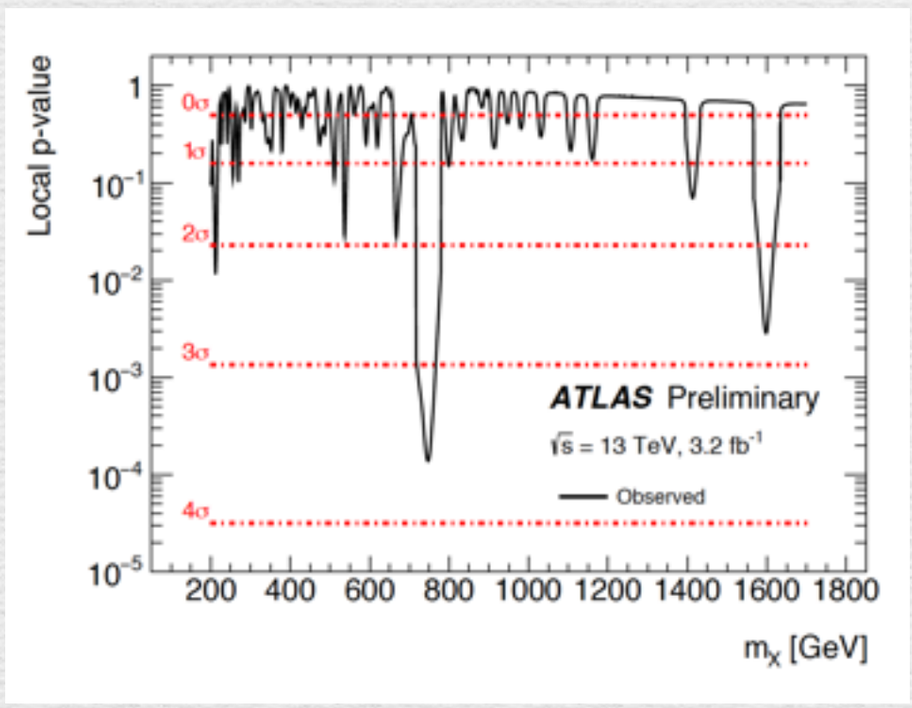


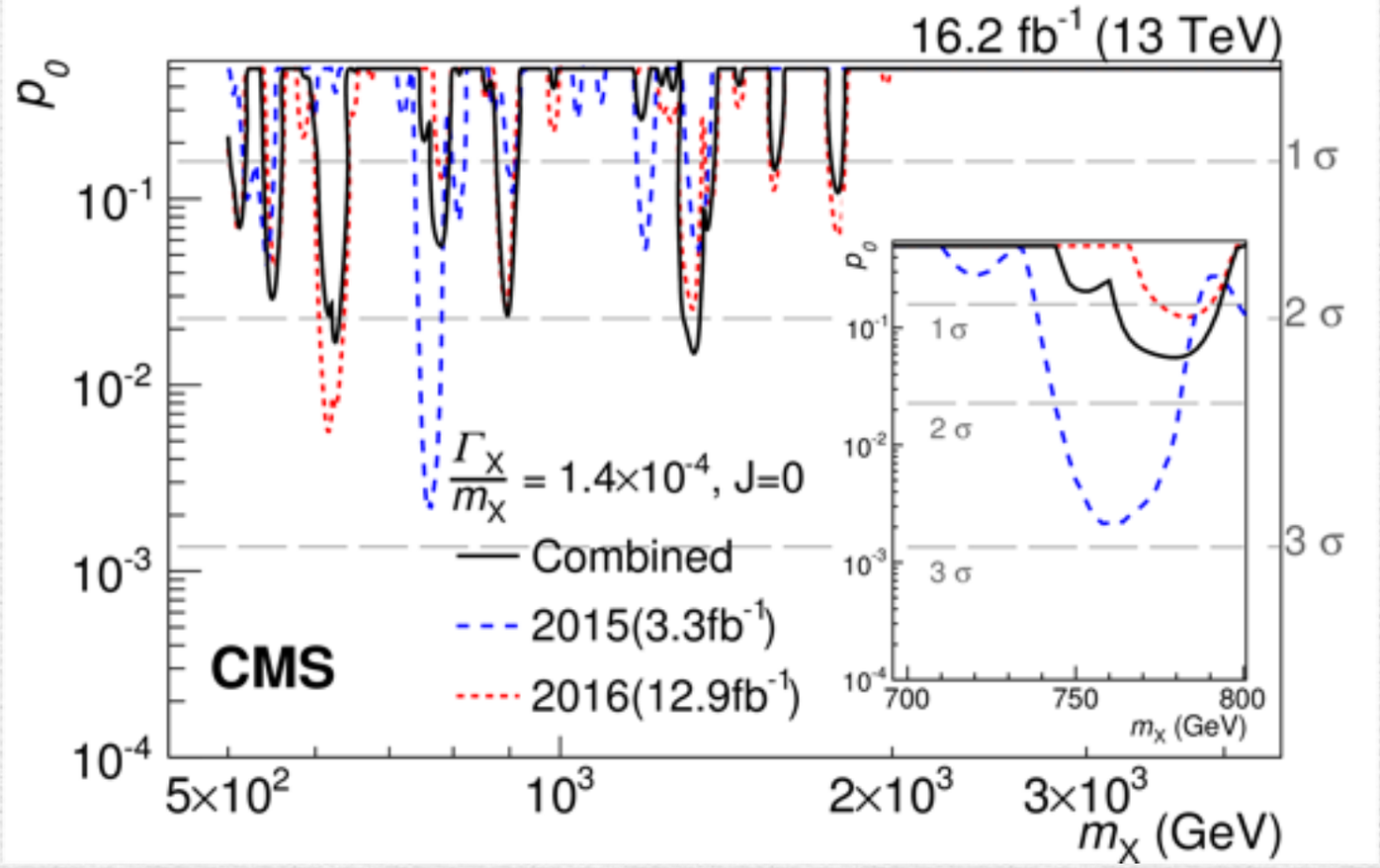
1. Plausible, theory-wise
2. Clean channel, modelling of BGs
3. Seen by both experiments
4. Increases with data-set, LHC8 to LHC13



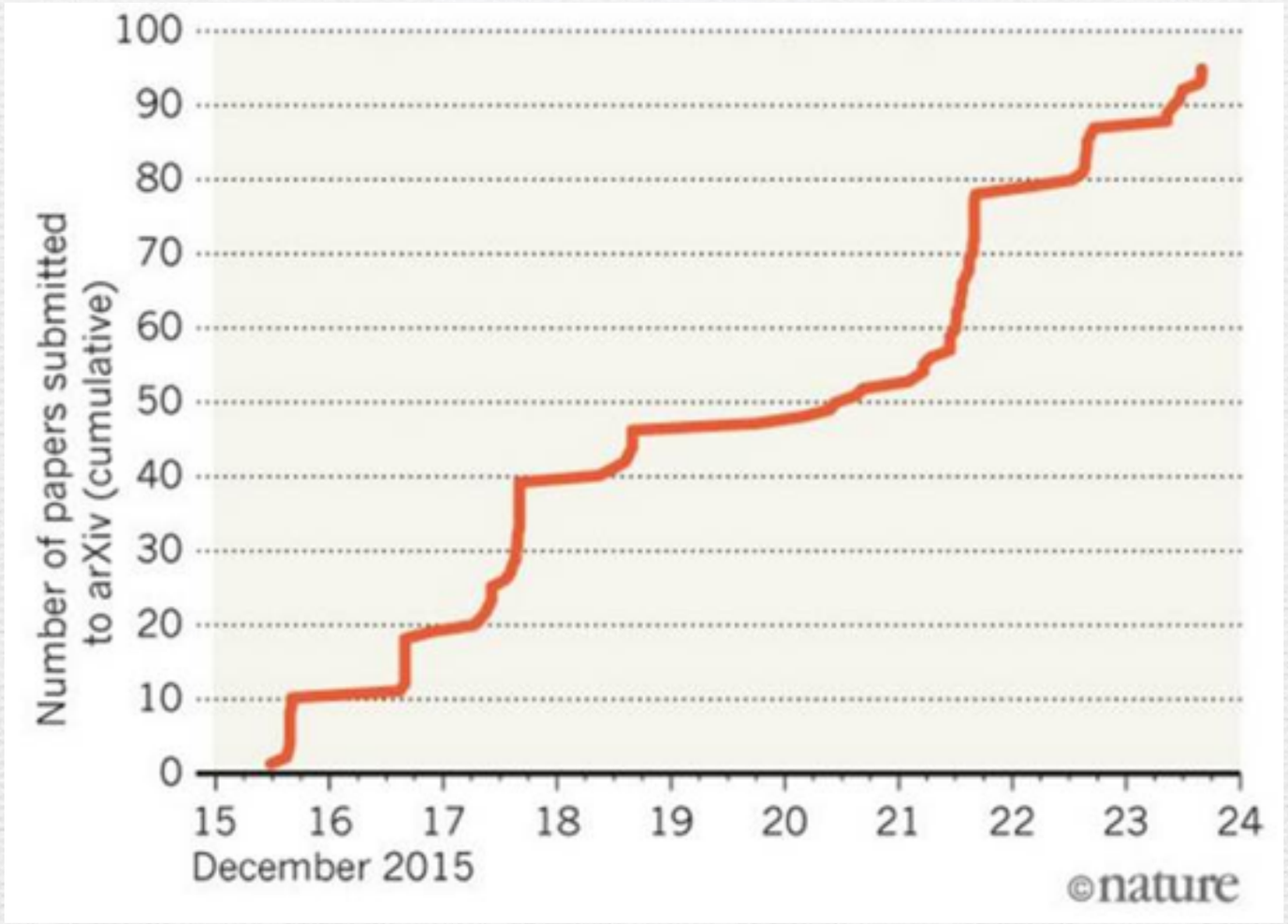


1. Plausible, theory-wise
2. Clean channel, modelling of BGs
3. Seen by both experiments
4. Increases with data-set, LHC8 to LHC13





Council meeting to Christmas



entire community (BSM) focused
ended in the summer with ~ 300 papers

The citation myth

Citation culture

metrics like

count of citations, h-index, h/(years-PhD)…

are

work's originality is probably more important but more difficult to gauge in a fair fashion

so,

is chasing ambulances a citation-collection exercise?
does it disadvantage other areas?

Following trails of anomalies is

Citation summary results	Citeable papers	Published only
Total number of papers analyzed:	37	30
Total number of citations:	1,890	1,865
Average citations per paper:	51.1	62.2
Breakdown of papers by citations:		
Renowned papers (500+)	0	0
Famous papers (250-499)	2	2
Very well-known papers (100-249)	3	3
Well-known papers (50-99)	3	3
Known papers (10-49)	16	15
Less known papers (1-9)	8	5
Unknown papers (0)	5	2
h_{HEP} index [?]	20	20

Damaged goods

de facto, citation discount

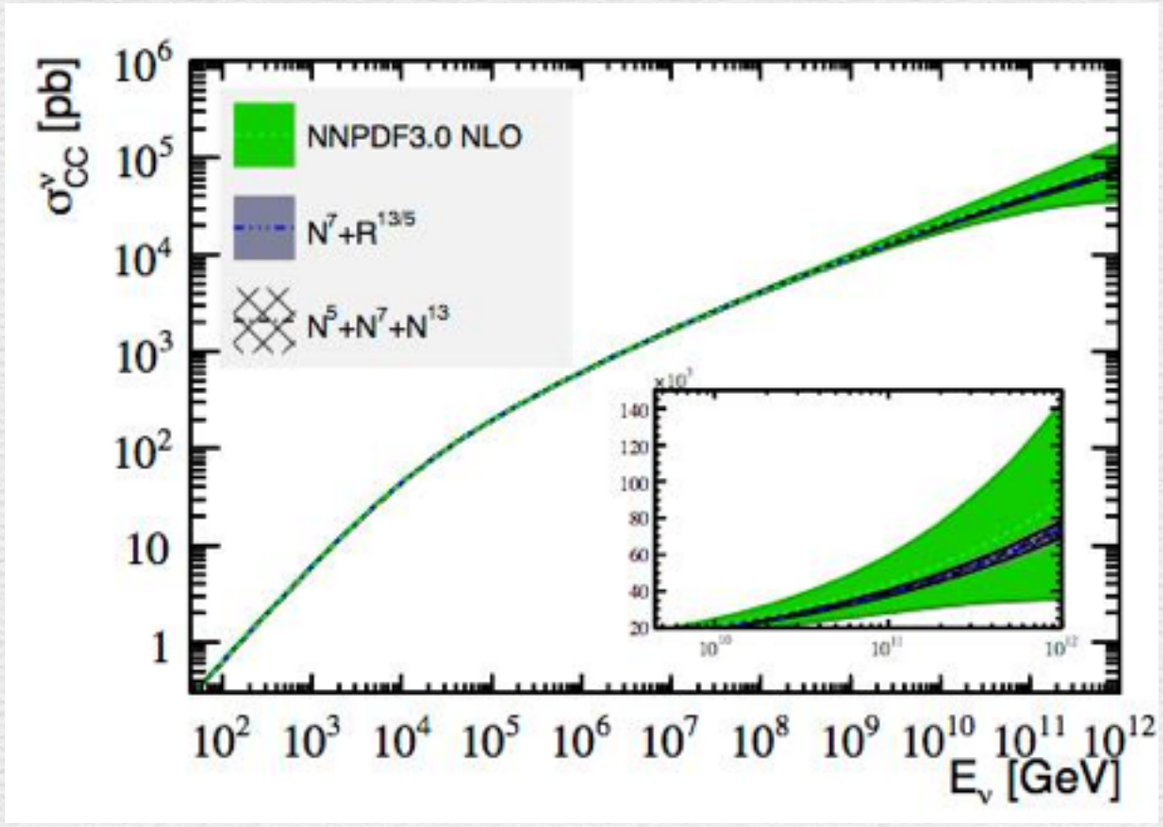
Why did we still go for it?

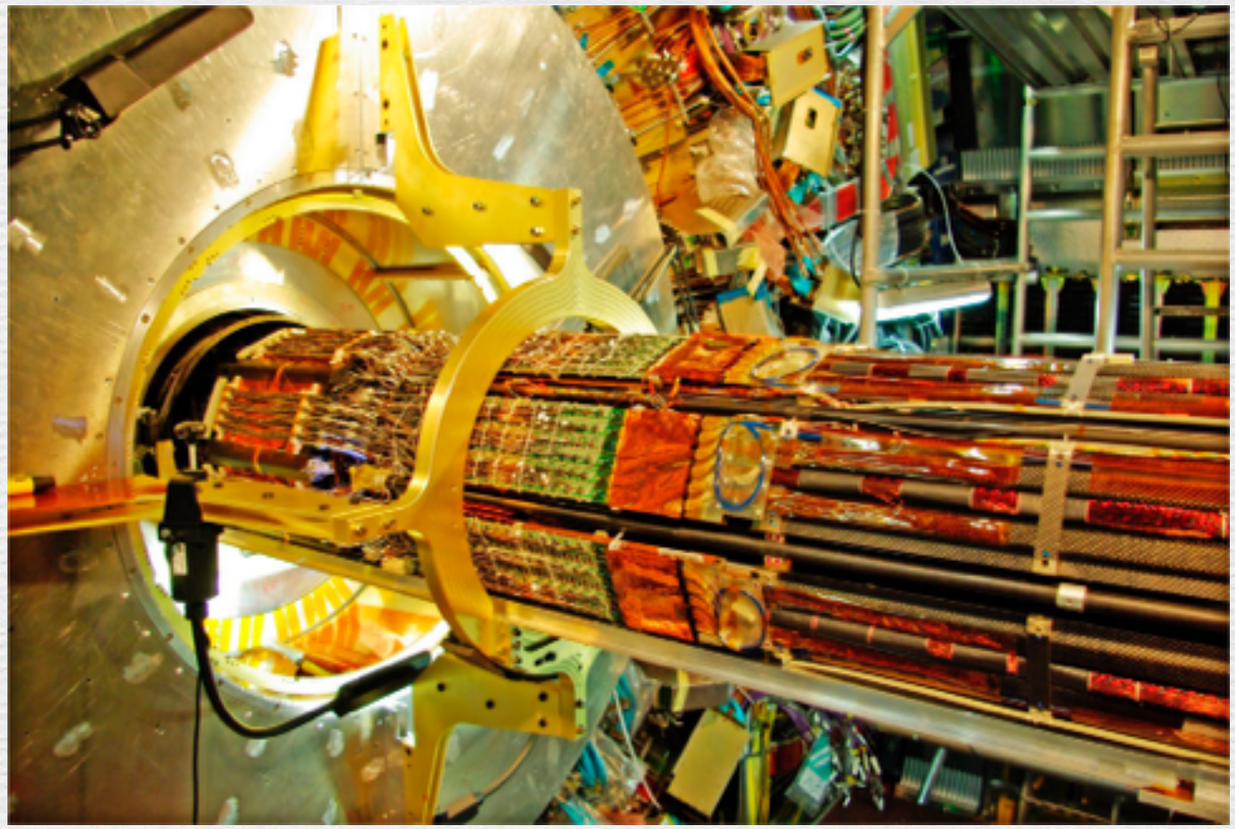
PAMELA
Fermi-lines
BICEP2
Hooperons
X(750)…

SM vs BSM?

SM calculations

pushing current level of understanding
requires extremely sophisticated analyses
and precise data to test them





recent paper by J. Rojo

Requires a lot of effort and ingenuity
sometimes we seem to lose track that

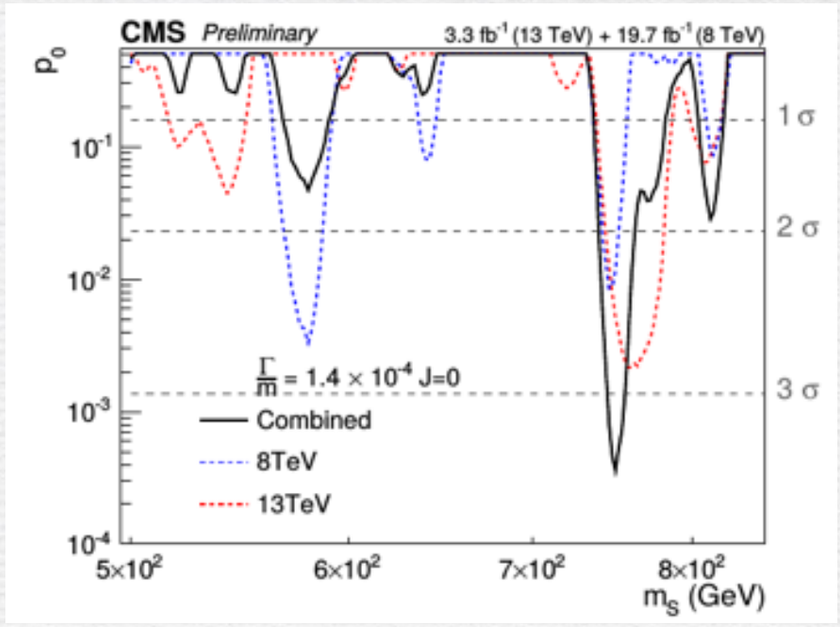
the
Beyond the Standard Model

Fundamentally, all this is about BSM

BSM community

our job description is to think out of the box, to make bold claims and test them, to be innovative

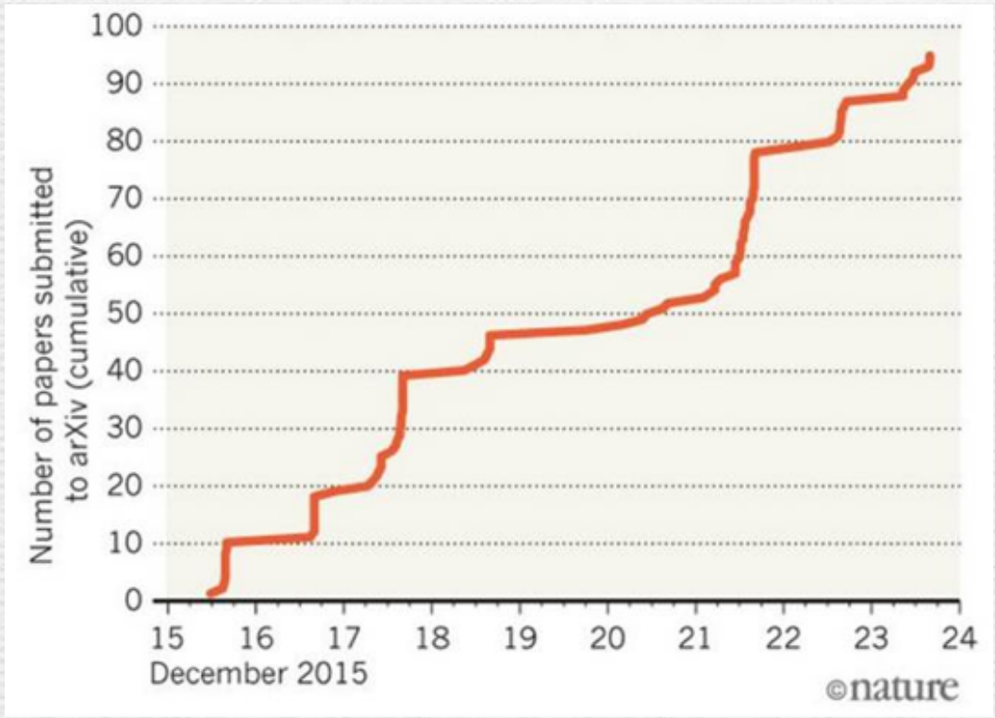
In our
to
hints



Not a BSM person

Wrong way to deal with a BSM person

X(750), lessons learnt



I don't see any
BSM people did
aware of risking their
reputation (and job prospects)

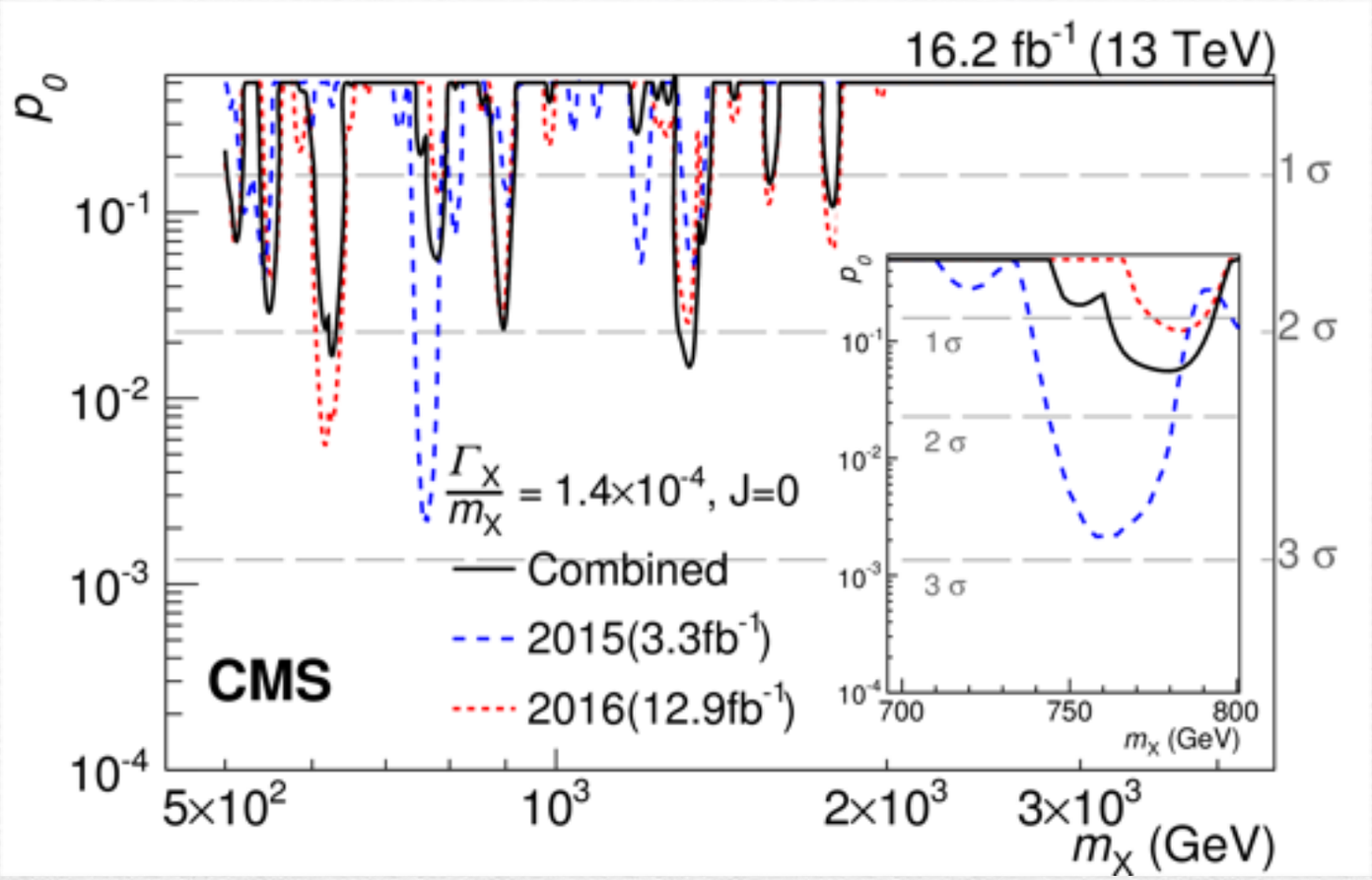
Public view incl. policy makers, politicians

'Crying wolf' is not a good comparison

This is a good example of the scientific method

Exactly what we teach our students:
origins of QM, relativity

Do you think the public resents learning about our excitement and disappointments?



post-mortem from experiments?

did experiments influence each other

meaning/use of LEE

More importantly,

to use this as a reason for more obscurantism, less communication with BSM theory

on the contrary

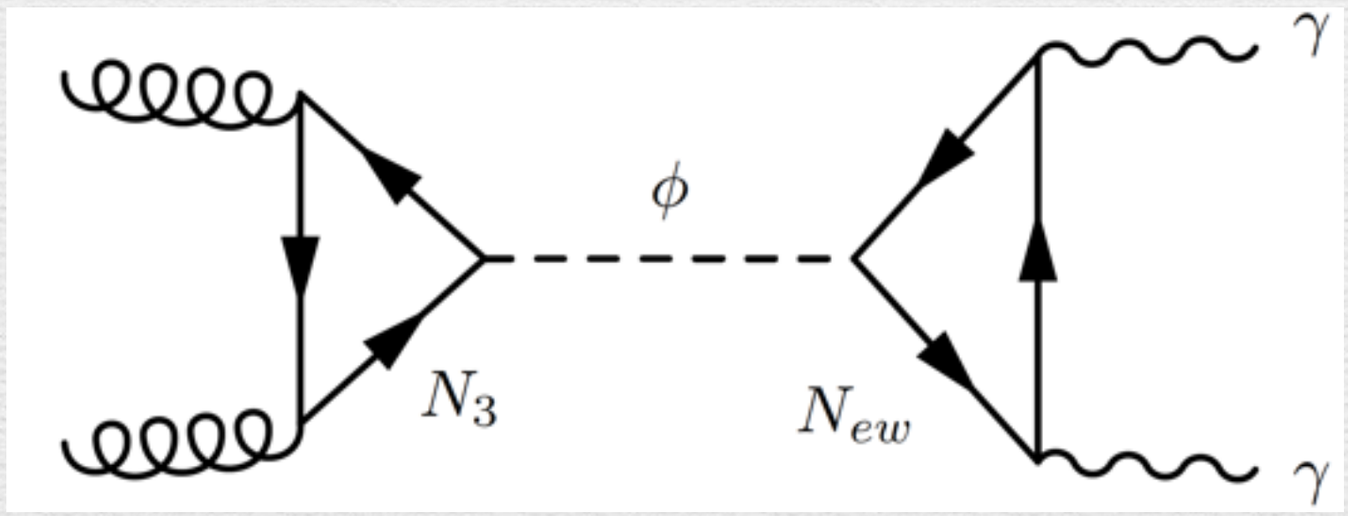
What did we learn from these 300 papers?

loads of new ideas!

minimal theories (e.g. MSSM, NMSSM)
failed to explain the signal strength and lack
of other signatures

who ordered that?

Brought us
exactly the kind of thing we like doing



Some examples

Interference effects

Extended SUSY
e.g. N=2 Higgs sector

Revival of warped gravitons
making them light is a model-building tour de force

Non-minimal Composite Higgs models

New vector-like quarks, in general
adding more matter
implications for DM and GUTs

Conclusions

- X(750) had a very exciting, short life
- Left a trace of reactions, and provoked a huge amount of new theoretical ideas
- Did we deal with this in the right way? public opinion, our own dynamics
- We all hope for new physics in this Run, and hopefully this doesn't deter collaborations from putting out controversial results