



JRA1 – WP19 = LHC-COMBINE, AKA HONEXCOMB

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(for the crew)



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PLAN OF PRESENTATION

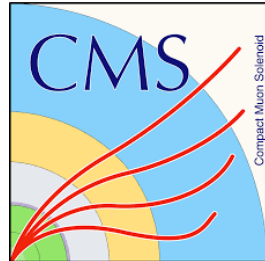
- 1) Scientific results obtained since last year
- 2) Modifications of the scientific work plan (as compared to the initial plan in the grant agreement)
- 3) Possibilities/needs of another request for the extension of the project (beyond 30 November 2023)

0 – REMINDER OF THE HONEXCOMB IDEA





ALICE



0 – REMINDER OF THE HONEXCOMB IDEA

“ Inter-experiment combination of heavy-ion measurements at the LHC ”

- Animation of a vivid forum
- Cross-experiment combination work (papers)

+ other actions

- Comparing methods or observables (Centrality...)
- Producing or endorsing comparison plots
- Identifying (and solving) tensions

0 – ORGANIZATIONAL ASPECTS

4+1 spokespersons / contacts + hosts for 4x1+ year of postdoc

- Alexander Kalweit (CERN) in Alice + Jacek Otwinowski (INP, Krakow, Poland);
- Iwona Grabowska-Bold (AGH UST, Krakow, Poland) in Atlas;
- Giulia Manca (INFN Cagliari, Italy) in LHCb;
- Raphaël Granier de Cassagnac (Polytechnique, France) in CMS.

+ 2 theorists as of early 2021

- Christian Bierlich (Lund, Sweden) Jacopo Ghiglieri (Subatech, France)

Set up communication tools

- Wiki : <https://twiki.cern.ch/twiki/bin/view/Honexcomb>
- Mailing list (120 people) honex-comb@cern.ch created ([feel free to subscribe](#))
- Meetings : kick-off in January 2020, 15 meetings as of today (13 remote, doesn't help)

→ <https://indico.cern.ch/category/11797/>

*+ 3 meetings
this year*

1 – SCIENTIFIC TOPICS AND RESULTS

Discussed in meetings (#talks)

- Heavy Flavours* (13)
 - Quarkonia (5)
 - Light-by-light scattering (4)
 - nPDF (3)
- } From proposal
- + Centrality definition
 - + Top quarks
 - + Jets* (2)
 - + EM moment of tau (3)

1 – SCIENTIFIC TOPICS (1/3)

Discussed in meetings (#talks)

- Heavy Flavours* (13)

- Quarkonia (5)

- Light-by-light scattering (4)

- nPDF (3)

+ Centrality definition

+ Top quarks

+ Jets* (2)

+ EM moment of tau (3)

+ First identified common work

Complementary phase space (Alice, CMS, LHCb)

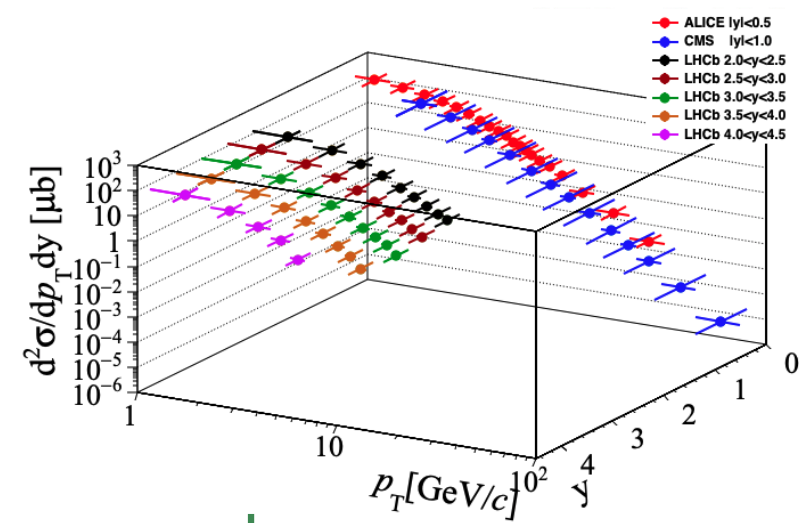
Restructured team; a 40-page draft exists; incorporating Λ_c

Goal: submit a few-author paper in Jan/Feb 23

Combination of charm measurements
from the ALICE, CMS and LHCb
experiments in pp collisions at
 $\sqrt{s} = 5.02$ TeV

A Author

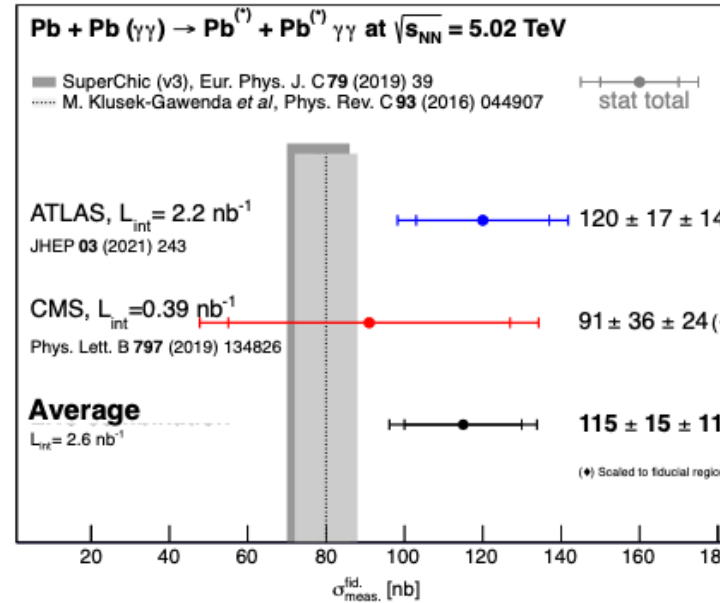
September 7, 2022



1 – SCIENTIFIC TOPICS (2/3)

Discussed in meetings (#talks)

- Heavy Flavours* (13)
- Quarkonia (5)
- Light-by-light scattering (4)
- nPDF (3)
- + Centrality definition
- + Top quarks
- + Jets* (2)
- + Anomalous em moment of tau (3)



+ Second identified common work

Small team to work out a first combination in the same phase space (ATLAS+CMS) in order to raise the significance

Talk accepted by Quark Matter + up-coming proceedings

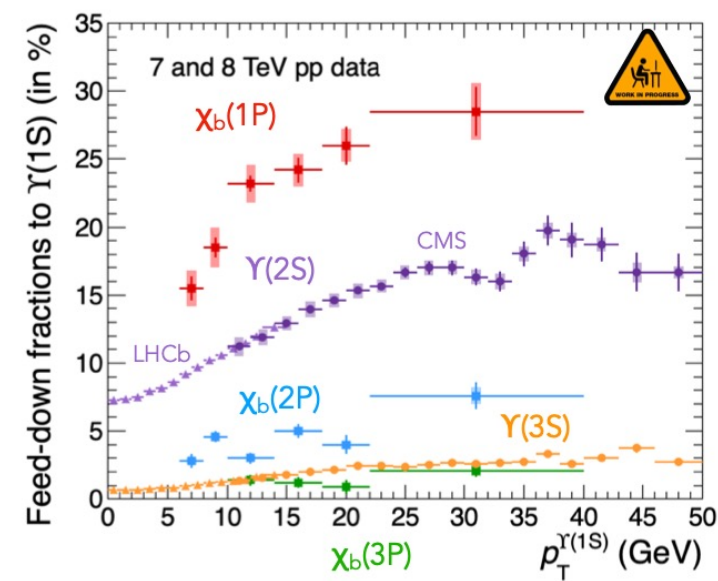
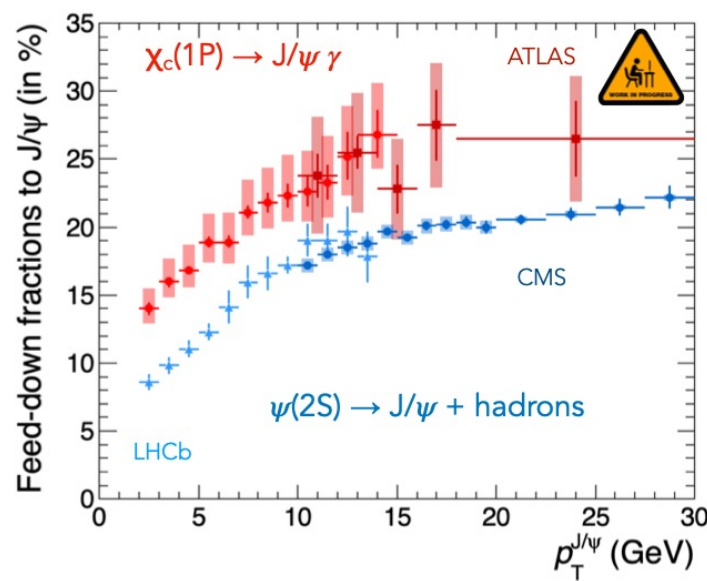
preprint: [arxiv:2204.02845](https://arxiv.org/abs/2204.02845) (not submitted to journal)

Goal: full official combination with full 2018 CMS data, signed by both collaborations

1 – SCIENTIFIC TOPICS (3/3)

Discussed in meetings (#talks)

- Heavy Flavours* (13)
- Quarkonia (5)
- Light-by-light scattering (4)
- nPDF (3)
- + Centrality definition
- + Top quarks
- + Jets* (2)
- + Anomalous em moment of tau (3)



See F. Damas talk from Monday ([link](#))

+ Third identified common work

Small team (CMS+LHCb) to work out the feeddown contributions to the Upsilon states

+ Now also to the J/ψ state

Goal: a few-author reference paper on the subject by Spring 2023

1 – SCIENTIFIC TOPICS (4/3)

Discussed in meetings (#talks)

- Heavy Flavours* (13)
- Quarkonia (5)
- Light-by-light scattering (4)
- nPDF (3)
- + Centrality definition
- + Top quarks
- + Jets* (2)
- + Anomalous em moment of tau (3)

Next ?

1 – ANOTHER SCIENTIFIC ACHIEVEMENT

An official LPCC heavy-ion working group was created

- Important if we move to formal joint publications
- Important if we want to live beyond Strong-2020
- <https://lpcc.web.cern.ch/content/lhc-hi-wg>
- Dedicated mailing list [[subscribe](#)]

Conveners are →

Two open meetings: Jul 21, Feb 22

- Jul 21: Kick-off meeting, collection of talks
- Feb 22: discussions on event activity estimators

Four closed meetings

Posterity

Conveners:

- ALICE: Alexander Kalweit and Marta Verweij
- ATLAS: Iwona Grabowska-Bold and Jiangyong Jia
- CMS: Raphael Granier de Cassagnac and Yi Chen
- LHCb: Giulia Manca and Benjamin Audurier
- Theory: Liliana Apolinario and Urs Wiedemann
- Reach all through lhc-hiwig-admin@cern.ch

2 – MODIFICATIONS OF THE SCIENTIFIC WORK PLAN

Strong-2020 postdocs joined in 2021 (later than expected)

- In CMS @ Polytechnique: Florian Damas (from Alice) joined in on Feb. 1st
- In LHCb @ INFN Cagliari: Jiayin Sun, joined on Sep. 1st (but was already around)
- In ALICE @ INP, Krakow: Sándor Lökös, joined on Sep. 1st with Jacek Otwinowski
- In ATLAS @ AGH UST, Krakow: Yuriy Volkotrub, joined on Nov. 1st

First x-collaboration work is out

- At least one abstract submitted to Quark Matter'22 (4-10 April 2022)
- Three teams are working to provide more

Remark: Overall, starting such a federative active remotely was not optimal

2 – MODIFICATIONS OF THE SCIENTIFIC WORK PLAN

D19.1 = Vivid Forum / January 2020 / <https://twiki.cern.ch/twiki/bin/view/Honexcomb>

MS32 = Kick-off / January 2020 / <https://indico.cern.ch/event/872670/>

D19.2 = Road Map / April 2020 / <https://twiki.cern.ch/twiki/pub/Honexcomb/WebHome/Roadmap.pdf>

D19.3 = Cross-experiment papers / “After month 12, for instance month 12, 24, 36, 48” → **Only one is out !**

D19.4 = Outlook report paper / ”Before the end” → Will try to gather a workforce...

Work package number	19															
Work package acronym	LHC-Combine															
Work package title	JRA1-Inter-experiment combination of heavy-ion measurements at the LHC															
TASKS/Subtasks	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Animation of a forum		1														
2. Cross-experiment combination work				2												

3 – POSSIBILITY OF AN EXTENSION OF THE PROJECT

Always welcome, but no absolute need on our side

- Postdocs arrived in Nov. 2021 the latest, for 2 year at most
- Most of the money can be spent in that time frame
- Posterity is assured with the LPCC working group

More time would still allow to deliver **more work**

- In particular, the heavy-ion run was delayed at the LHC (from Dec. 22 to Sep. 23) which can be used as a perfect excuse for an extension...
- *"in order to initiate early combination work on LHC run-3"*
- Note that TA1 – CERN expressed an interest for a 6 months extension