



WP2 structure (and organisation, webpage, meetings, etc.)

E. Métral and R. Tomás

Many thanks for the inputs from: G. Skripka, N. Mounet, R. Bruce, X. Buffat, R. De Maria, M. Giovannozzi, G. Iadarola, G. Sterbini (and B. Salvant, S. Redaelli and Y. Papaphilippou)



Context: Previous structure (end 2020)

- ◆ WP2 L: G. Arduini
- ◆ WP2 DL: R. Tomás
- ◆ WP2 SS: N. Mounet and G. Skripka
- ◆ Task 2.2: Optics and layout (R. De Maria)
- ◆ Task 2.3: Particle simulations (M. Giovannozzi)
- ◆ Task 2.4: Collective effects (E. Métral)
- ◆ Task 2.5: Beam-beam effects (Y. Papaphilippou)
- ◆ Task 2.6: Beam parameters
- ◆ Task 2.7: Intensity limitations from existing HW (G. Iadarola)
- ◆ *Ions (R. Bruce) since 2020*

Sites

Task 2.2 Optics and Layout

Task 2.3 Particle Simulations

Task 2.4 Collective Effects

Task 2.5 Beam-Beam Effects

Task 2.6 Beam Parameter

Task 2.7 Intensity limitation from existing LHC hardware



Context: Previous structure (end 2020)

- ◆ WP2 L: **G. Arduini**
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- ◆ Task 2.2: Optics and layout (R. De Maria)
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- ◆ Task 2.4: Collective effects (**E. Métral**)
- ◆ Task 2.5: Beam-beam effects (**Y. Papaphilippou**)
- ◆ Task 2.6: Beam parameters ?
- ◆ Task 2.7: Intensity limitations from existing HW (G. Iadarola) ?
- ◆ *Ions (R. Bruce) since 2020 => **New Task needed ?***
- ◆ *OMC takes care of the HL beam-based correction strategies and estimates (various LNO members. D. Gamba has been taking care of PC specs, BPM specs, orbit correction simulations, etc.) => **New Task?***

Sites

Task 2.2 Optics and Layout

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Context

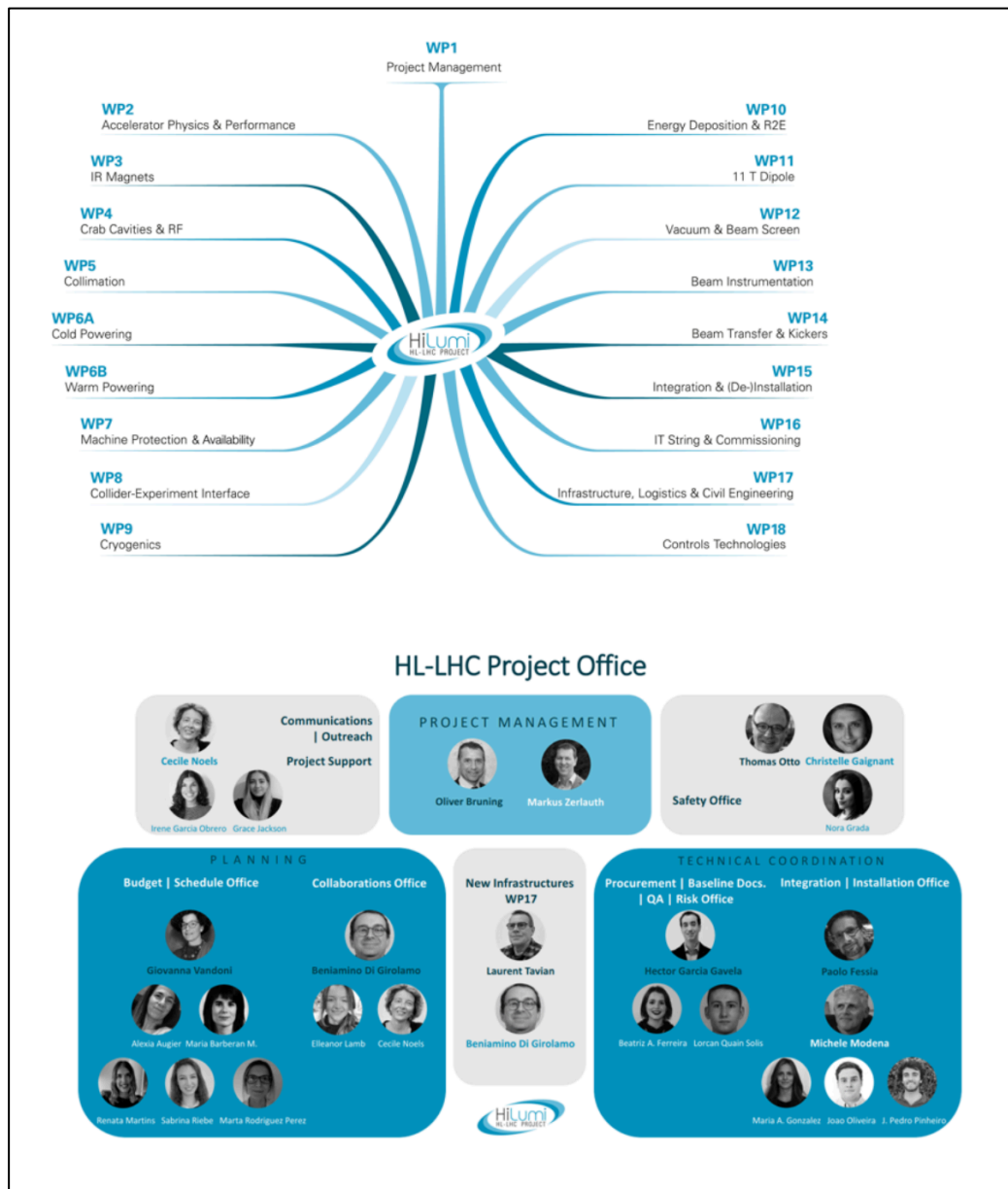
- ◆ **Request:** Rogelio asked me to review the WP2 structure and organization
- ◆ **Action:** I discussed with the 2 SS + all the people who should be Task Leaders + ATS-IWG chair (all people on previous slide) => Many thanks for all your input!
- ◆ **Impression:** it proved to work very well until now, mandate is fine, etc. => Maybe **no need to do anything and one could just continue like this (confirming it was well done before)**
- ◆ **Possible “updates / improvements”? BUT**
 - Need to bring something to WP2 team, people and project => No need to change anything if this is not helping us and/or the project
 - Need to be approved of course by Rogelio and management

INTRODUCTION

AND

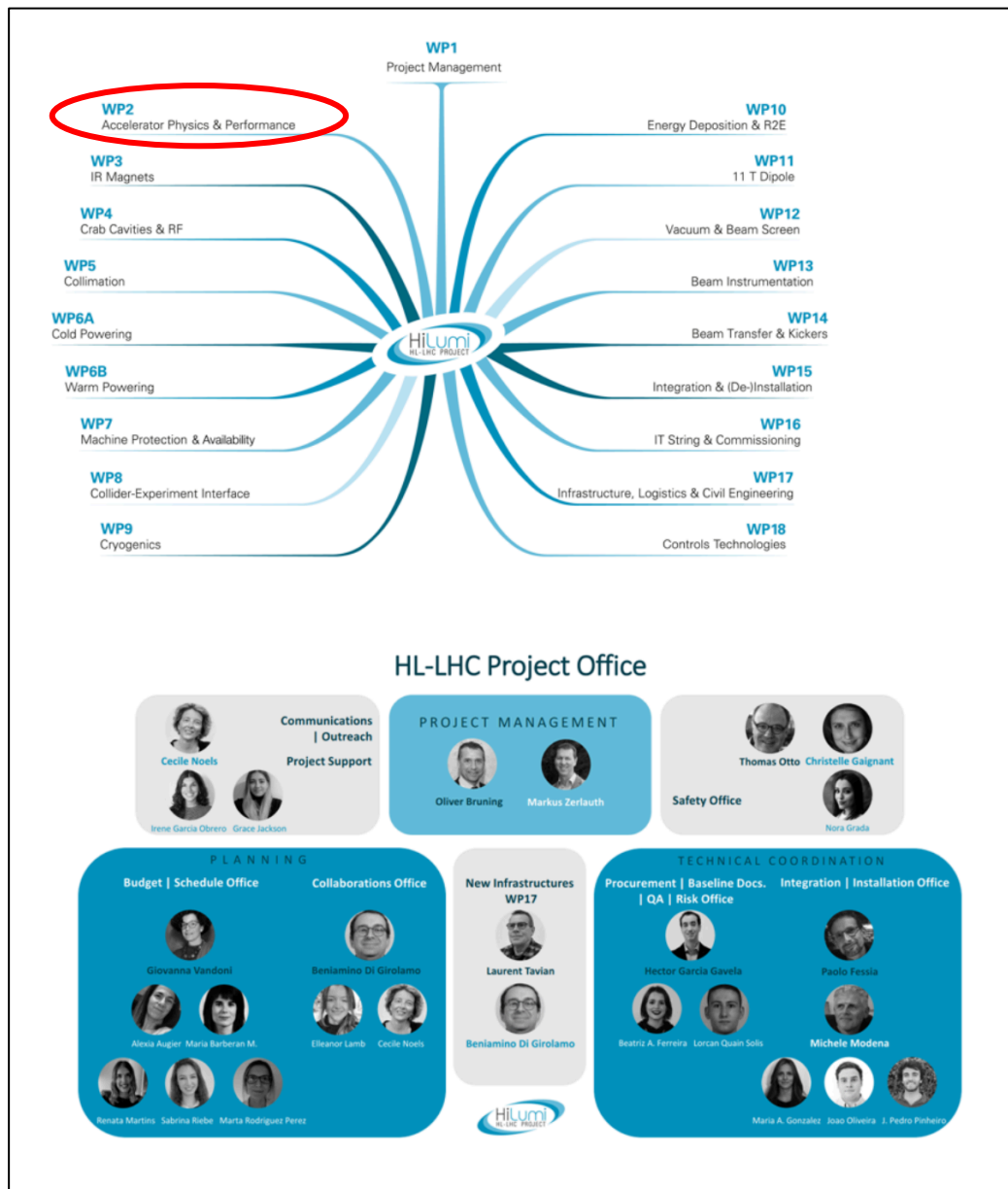
MOTIVATION

HL-LHC webpage



<https://espace.cern.ch/HiLumi/default.aspx>

HL-LHC webpage



<https://espace.cern.ch/HiLumi/default.aspx>

WP2 webpage



HiLumi LHC Work Package 2 - Accelerator Physics and Performance

HiLumi Public Site

HL-LHC Intranet

HL-LHC Project Indico Page

HL-LHC WP2 Page

HiLumi LHC Work Package 2 - Accelerator Physics and Performance

Pages

WP2 Home

HL-LHC main parameters and assumptions

WP2 meetings (Indico)

WP2 Meetings (list)

Actions

Machine Development Studies

References

Calendar

Sites

Task 2.2 Optics and Layout

Task 2.3 Particle Simulations

Task 2.4 Collective Effects

Task 2.5 Beam-Beam Effects

Task 2.6 Beam Parameter

Task 2.7 Intensity limitation from existing LHC hardware

People and Groups

Other Meetings

Site Contents

WP2: Beam Dynamics

WP2 is responsible for:

- developing operational scenarios and layout options in collaboration with WP3, WP4, WP10, WP15
- developing optics configurations
- specifying field quality for new beam line elements
- evaluating intensity limitations and developing mitigation strategies
- evaluating the overall performance reach.

WP2 is organized in several tasks covering this mandate.

The main HL-LHC operational scenarios and assumptions are available in the [HL-LHC parameters page](#) (Parameters and Layout Committee).

Additional information is also available from the [WP2 Task pages](#).

WP2 meetings and slides are available on [Indico](#) and on the [Meetings](#) page, which also contains the tentative agenda for the next meetings.

Lists of open items and questions to be addressed in future meetings are listed on the [Team Discussions page](#).

Relevant reports, papers and documents are listed on the [References page](#).

Tables, references and resources regarding noise are listed in the [Noise studies page](#).

<https://espace.cern.ch/HiLumi/WP2/Wiki/Home.aspx>

Announcements

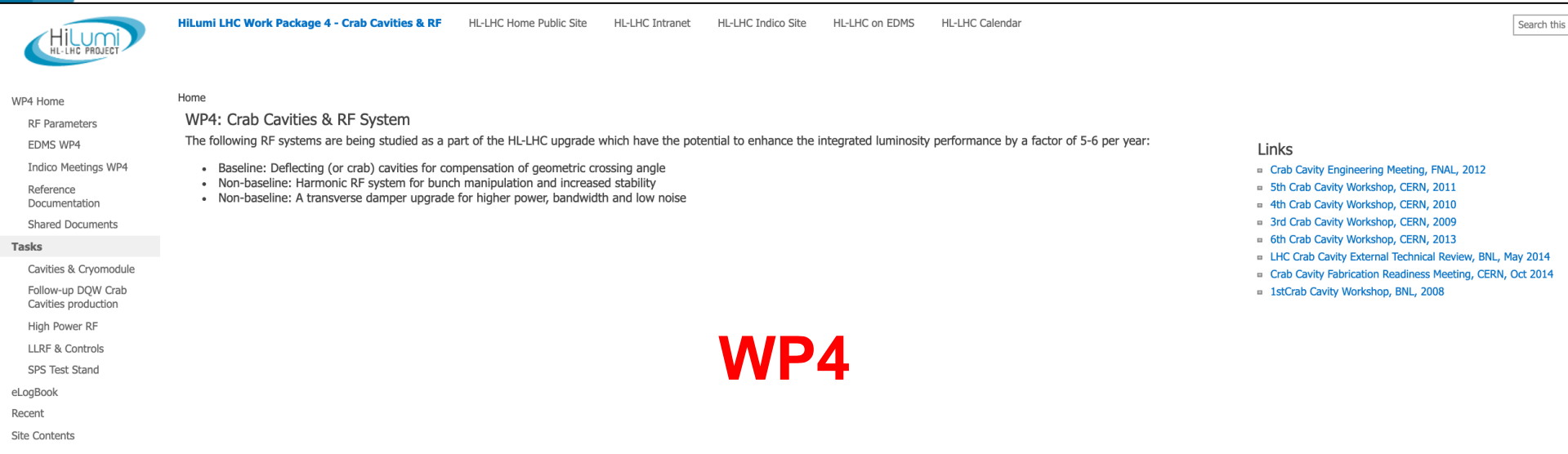
There are currently no active announcements.

Calendar

There are currently no upcoming events.

[\(More Events...\)](#)

Some other WPs' webpages



The screenshot shows the website for HiLumi LHC Work Package 4 - Crab Cavities & RF. The header includes the HiLumi logo and navigation links: HL-LHC Home Public Site, HL-LHC Intranet, HL-LHC Indico Site, HL-LHC on EDMS, and HL-LHC Calendar. A search bar is located in the top right corner. The main content area is titled "WP4: Crab Cavities & RF System" and contains a paragraph: "The following RF systems are being studied as a part of the HL-LHC upgrade which have the potential to enhance the integrated luminosity performance by a factor of 5-6 per year:". Below this is a bulleted list of RF systems: Baseline (Deflecting or crab cavities for compensation of geometric crossing angle), Non-baseline (Harmonic RF system for bunch manipulation and increased stability), and Non-baseline (A transverse damper upgrade for higher power, bandwidth and low noise). A "Tasks" sidebar on the left lists various activities like Cavities & Cryomodule, Follow-up DQW Crab Cavities production, High Power RF, LLRF & Controls, and SPS Test Stand. A "Links" section on the right lists several meetings and workshops, including Crab Cavity Engineering Meeting, FNAL, 2012; 5th Crab Cavity Workshop, CERN, 2011; 4th Crab Cavity Workshop, CERN, 2010; 3rd Crab Cavity Workshop, CERN, 2009; 6th Crab Cavity Workshop, CERN, 2013; LHC Crab Cavity External Technical Review, BNL, May 2014; Crab Cavity Fabrication Readiness Meeting, CERN, Oct 2014; and 1st Crab Cavity Workshop, BNL, 2008.

WP4



The screenshot shows the HiLumi LHC Project Intranet website. The header includes the HiLumi logo and navigation links: HL-LHC Public Site, Indico Meetings, EDMS Structure, E-groups, ATS Sector, LIU Project, QUACO Project, and HL-LHC Industry Site. A search bar is located in the top right corner. The main content area is titled "Announcements" and contains a paragraph: "WP5 webpage is http://lh-collimation-upgrade-spec.web.cern.ch/lhc-collimation-upgrade-spec/ by Agnes Szeberenyi". Below this is a "Calendar" section with the text: "There are currently no upcoming events." A "Team Discussion" section on the right shows a discussion board with a "new discussion" button and a "Recent" tab. The "Tasks" section below it states: "There are no items to show in this view of the 'Tasks' list." The "Links" section at the bottom right contains a link to the WP5 webpage: http://lh-collimation-upgrade-spec.web.cern.ch/lhc-collimation-upgrade-spec/.

WP5

=> Are there interests to maintain our WP2 webpage?

What we tried to review

- ◆ **Tasks:** Activities (evolution: main past results, current studies and future challenges), mandate, resources, Task Leader
- ◆ **Mandate of WP2:** Any update needed?
- ◆ **Webpage:** Do we need to keep it up-to-date? Useful information?
- ◆ **WP2 meetings:** Pace, length...
- ◆ **Actions and follow-up**
- ◆ **Other meetings:** Which ones? Who should attend which ones? Who receive the invitations? Highlights/relevant info to be sent... => E.g. TCC meetings on Thursday afternoons
- ◆ **EDMS/ECR/Drawings:** Who receive what? Who should comment? Are we sure we receive and comment all documents?...
- ◆ **Events and milestones:** For this year and for the future
 - E.g. 2 PSM (Project Steering Meetings) / year => 25/03/21 and 30/09/21 for the coming year
 - PSM covers the budget and schedule part => Rogelio
 - Another presentation in the following TCC covers the technical progress => Elias
- ◆ **Any other input/comments welcomed**

RESOURCES

ABP-LNO section (Rogelio)

- ◆ Rogelio Tomàs
- ◆ Riccardo de Maria 50%
- ◆ Tobias Persson 10%
- ◆ Ewen H. Maclean 10%
- ◆ Joschua W. Dilly (Gentner DOCT) 100%
- ◆ Andreas Wegscheider (FELL) 100%
- ◆ Hector Garcia Morales (COAS) 100% (will leave in August)

ABP-CEI section (Giovanni)

- ◆ Nicolò Biancacci 20%
- ◆ Xavier Buffat 50%
- ◆ Giovanni Iadarola 50%
- ◆ Lotta Methner 20%
- ◆ Elias Métral 45%
- ◆ Nicolas Mounet 60%
- ◆ Benoit Salvant ~ 5%
- ◆ Kostas Paraschou (DOCT: beam lifetime)
- ◆ Lorenzo Giacometti (DOCT: Crab cavities)
- ◆ Adnan Kurtulus (DOCT: impedance) No WP2 budget
- ◆ Sofia Johannesson (DOCT: e-cloud instabilities) No WP2 budget
- ◆ Sondre Vik Furuseth (COAS) until May 2021
- ◆ Galina Skripka (PJAS) and Francesco Giordano (DOCT: beam-induced heating), both leaving soon
- ◆ New FELL position for CE and impedance with Nicolas (May 2021 committee)?
- ◆ New FELL position for e-cloud with Gianni (May 2021 committee)?

ABP-INC section (Hannes)

- ◆ Guido Sterbini 50%
- ◆ Sofia Kostoglou (FELL) 100%
- ◆ Natalia Triantafyllou (DOCT – at least until 30/11/21) 100%
=> Crab cavity noise induced emittance growth (with WP4)
- ◆ Fanouria Antoniou 10%
- ◆ Davide Gamba 10%
- ◆ Ilias Efthymiopolous ~ 5%
- ◆ Future DOCT with Guido (May 2021 committee)?: Numerical modelling of long term evolution of colliding beams in the LHC

ABP-NDC section (Stefano)

- ◆ Massimo Giovannozzi 30%
- ◆ Roderik Bruce 10% WP2 and 20-30% Run3
- ◆ Carlo Emilio Montanari (DOCT) 100%
- ◆ Upcoming (FELL) 100%, ~ 6 months in 2021?

TASKS

Optics and layout (Riccardo)

- ◆ Proposed name: **same as before => Optics and layout**
- ◆ Mandate added by Riccardo on the WP2 / Task 2.2 webpage
=> The optics and layout task is in charge of:
 - Propose location and functional specifications for the new HL-LHC beam line equipment (magnets, crab cavities, absorbers, circuits) to obtain the required optical parameters
 - Verify that all new equipment is compatible with aperture requirements
 - Propose optics parameters suitable for the operational scenarios and design optics configuration for the cycle
 - Maintain the MAD-X optics repository for machine studies
 - Verify that layout drawings and data in the layout database is coherent with the optics models
 - Represent WP2 in the Hardware integration, Working group for alignment, Circuit working group

Optics and layout (Riccardo)

- ◆ Lot of layout options validation now
- ◆ In collaboration with several other WPs => Could be updated
- ◆ **Doing also the optics for ions** => Next: OP scenario needed
- ◆ Task 2.2 webpage up-to-date for the optics configurations but there are way more options
- ◆ **EDMS/ECR/Drawings documents**
 - Difficult to check all the things he is required to check (with present workload) => Seems some help needed here
 - Might be better also to speak with only 1 voice (for a team)
- ◆ **People** => Seems tight here
 - Riccardo 50%
 - Help from Sofia (FELL), training her

Particle simulations (Massimo)

- ◆ Proposed new title: **Single-particle DA simulations**
- ◆ Mandate => The task objectives are:
 - Study the field quality tolerances for new magnetic elements for the LHC upgrade
 - Evaluate the dynamic aperture and tolerances of the correction circuit settings
 - Evaluate the field quality tolerances for the crab cavities
 - Review correction strategies for the field quality of the IR magnets
- ◆ People
 - Massimo 30%
 - Carlo Emilio Montanari (DOCT) 100%
 - Upcoming (FELL) 100%, ~ 6 months in 2021?

Collective effects (Elias => Xavier)

- ◆ See recent discussion at CEI meeting: https://indico.cern.ch/event/1007412/contributions/4228042/attachments/2196801/3714493/25-02-2021_CEIMeeting.pdf
- ◆ Proposed new title: **Coherent effects and impedance**
- ◆ Mandate => The task objectives are:
 - Maintain up to date the HL-LHC impedance model following the design and construction of the new elements (Impedance WG)
 - Participate to the minimization of their impedance following the ALARA principle and report cases of incompatibility with the tolerances in terms of beam stability and beam induced heating
 - Verify experimentally the impedance of new elements
 - Study limitations due to coherent effects in the HL-LHC
 - Consolidate collective instability models and elaborate mitigation strategies
 - Provide estimates of the emittance growth due to decoherence and of the impact of coherent beam-beam effects => **Liaise with WP2 Task on Incoherent effects (Guido)**
 - **Liaise with WP2 Task on Electron cloud effects for interplay (Gianni)**
 - Participate to the elaboration of operational scenarios taking into account the constraints linked to collective effects, including beam-beam effects
 - Recommend relevant machine and beam parameters, procedures and tolerances
 - Verify experimentally the critical aspects

Collective effects (Elias => Xavier)

◆ People

- Xavier Buffat 50%
- Nicolò Biancacci 20%
- Nicolas Mounet 60%
- Benoit Salvant ~ 5%
- Adnan Kurtulus (DOCT: impedance)
- Sondre Vik Furuseth (COAS) until May 2021
- Francesco Giordano (DOCT: beam-induced heating) should leave soon
- New FELL position for CE and impedance with Nicolas (May 2021 committee)?

◆ Collaboration

- SY-RF team => Check exactly with the RF team how to collaborate (e.g.: agreement with R. Calaga on 09/09/20 that T. Argyropoulos will take care of the HL-LHC longitudinal impedance model). **Xavier checked already with Theo that he will take care also of the longitudinal thresholds estimates**
- La Sapienza: M. Migliorati (tbc)
- EPFL: B. Golomer and J. Wancyk

Beam-beam effects (Yannis => Guido)

- ◆ Proposed new activity title: **Incoherent effects**
 - => This includes beam-beam and its compensation, IBS, noise, emittance preservation, luminosity and lifetime
- ◆ Activity mandate: Supports the WP2 activity for validating the HL-LHC operational scenarios and the hardware tolerances in terms of beam-beam and noise effects, focusing on their incoherent aspects (DA, lifetime, losses, emittance growth) **in close collaboration with the Task on Coherent effects and impedances (Xavier) and the Task on Electron cloud effects (Gianni)**. This will be done mainly via numerical tracking studies and MD sessions
- ◆ Comments
 - Lacking resources mainly in the emittance evolutions studies (see Stefania Papadopoulou's studies)
 - **Manpower issue identified => Should therefore concentrate on few high priority items (clear priorities to be put)**
 - In the recent years, HL-LHC aspects were discussed in the Beam-beam and Luminosity Studies meeting
 - Some LHC activities seems to be under-represented in HL-LHC
 - Lot of activity with noise => Noise link on the WP2 webpage already (see later)
 - **Emittance evolution, blow-up => PHD will come to help (with Guido)**
 - **Luminosity model => Benchmarking of models ongoing (Rogelio with Stefania and Ilias)**

Beam-beam effects (Yannis => Guido)

◆ Selection of recent results

- Tune modulation in HL-LHC (S. Kostoglou et al., 1 PRAB paper)
- Source and impact of the dipolar noise on the (HL-)LHC (S. Kostoglou et al., 2 papers accepted in PRAB)
- Wire Compensation Studies (K. Skoufaris et al., 1 paper submitted to PRAB + A. Poyet et al., 1 paper in prep for PRAB submission)
- SPS CC noise emittance blow-up (N.Triantafyllou)
- Emittance and beam distributions studies (S. Papadopoulou et al., 1 PRAB paper)
- B4 tracking with BB (S. Kostoglou; G. Iadarola et al.; G. Sterbini et al.)

Beam-beam effects (Yannis => Guido)

◆ Present / future activities

- Investigation of the impact of not installing MS.10 on DA during the whole cycle and propose alternative scenarios (on going and high priority)
- Evaluation of the impact of a crab-cavity tilt on DA (all the masks are ready but hiccups with the implementation of the TILT in SixTrack)
- Preparation of the beam-beam simulation for ions beam to explore the lower limits on the crossing angle (in view of possibly decreasing beta*) and to confirm if we can run with vertical crossing in both IR1 and IR5 without issues
- Consolidating the BB tracking of B4
- PC noise studies (lower priority): preparation of the direct magnetic measurement in SM18 (thanks to M. Buzio's team) and exploiting EIQA data for the modeling the noise propagation in the (HL)-LHC MB sector

Beam-beam effects (Yannis => Guido)

◆ People

- Guido Sterbini 50%
- Sofia Kostoglou (FELL) 100%
- Natalia Triantafyllou (DOCT: CC) 100% until (at least) 30/11/2021
- Fanouria Antoniou 10%
- Davide Gamba 10%
- Ilias Efthymiopolous ~ 5%
- Future DOCT with Guido (May committee)?: Numerical modelling of long term evolution of colliding beams in the Large Hadron Collider

◆ Collaborators

- Philippe Belanger (from TRIUMF, DOCT since December 2020, mostly worked for Run3, supervised by Rick BAARTMAN)
- Dobrin Kalchev (from TRIUMF, <https://fiveyearplan.triumf.ca/investigations-of-beam-beam-effects-in-hl-lhc/>)
- A new DOCT from University of Manchester on “Beam-beam and crab cavity proton dynamics for the LHC luminosity upgrade” (supervised by Robert Appleby for University of Manchester, not started yet)

Intensity limitations from existing HW? (Gianni)

- ◆ See recent discussion at CEI meeting: https://indico.cern.ch/event/1007412/contributions/4241226/attachments/2196906/3714667/003_ECE_task_at_CEI_meeting.pdf
- ◆ Proposed new title: **Electron cloud effects**
- ◆ Mandate => The team is responsible for the modeling of Electron Cloud Effects for the HL-LHC collider and in particular:
 - Study the e-cloud buildup in the HL-LHC machine, providing recommendations and specifications for HL-LHC hardware design
 - Provide estimates for the heat loads induced by e-cloud for the cryogenic components of the machine
 - Study the coherent effects of the e-cloud on the beam dynamics and, in particular, on beam stability **in close collaboration with the Task on Coherent effects and impedances (Xavier)**
 - Study the incoherent effects of the e-cloud on the beam dynamics, including beam losses and emittance blowup, **in close collaboration with the Task on Incoherent effects (Guido)**
 - Perform experimental studies at the LHC to validate and improve the predictions from numerical models and simulations, which are used for the HL-LHC design
 - Develop methods and numerical tools required to pursue the aforementioned objectives

Intensity limitations from existing HW? (Gianni)

◆ People

- Giovanni Iadarola 50%
- Lotta Mether 20%
- Galina Skripka (PJAS) leaving soon
- Kostas Paraschou (DOCT: beam lifetime)
- Lorenzo Giacometti (DOCT: CC)
- Sofia Johannesson (DOCT: e-cloud instabilities)
- New FELL position for e-cloud with Gianni (May 2021 committee)?

Ions (Roderik)

- ◆ Proposed title: **Ion beam operation**
- ◆ Mandate: responsible for
 - Devising machine configurations and operational scenarios for HL-LHC operation with ion beams
 - Assessing the HL-LHC performance with ion beams
 - Studying performance improvements and how potential limitations with ion beams can be mitigated

=> Where needed, this work will be carried out in close collaboration with other WP2 tasks or other WPs
- ◆ People
 - Roderik 10% WP2 and 20-30% Run3
 - John Jowett (retiree)
 - Michaela Schaumann from OP
 - Colleagues from WP2, WP5 and WP10 and injectors

PROPOSED UPDATED WP2 MANDATE

Proposed updated WP2 mandate

- ◆ WP2 is ~~responsible for~~ **in charge** (for both protons and ions) of:
 - developing operational scenarios and layout options in collaboration with **most of HL-LHC WPs**
 - developing optics configurations **and their orchestration in the cycle**
 - specifying field quality for new beam line elements **and tolerances for alignment and power converters noise (PC and BPM specs)**
 - **validating new hardware by checking the aperture, the impedance, the electron cloud and beam-beam effects, and the noise**
 - **defining optics commissioning strategies**
 - evaluating ~~intensity~~ limitations **in intensity, and in performance in general**, and developing mitigation strategies
 - evaluating the overall performance reach **in terms of integrated luminosity and beam lifetime**
- => Let's finalize it altogether (many thanks in advance!)

Proposed updated WP2 mandate

- ◆ WP2 is organized in several tasks covering this mandate
- ◆ The main HL-LHC operational scenarios and assumptions are available in the **HL-LHC parameters page (Parameters and Layout Committee)** => **I do not have permission!**
- ◆ Additional information is also available from the **WP2 Task pages** => **To be updated if we want to keep this!**
- ◆ WP2 meetings and slides are available on **Indico** and on the **Meetings** page, which also contains the tentative agenda for the next meetings
- ◆ Lists of open items and questions to be addressed in future meetings are listed on the **Team Discussions page**
- ◆ Relevant reports, papers and documents are listed on the **References page**
- ◆ Tables, references and resources regarding noise are listed in the **Noise studies page**

Other links to be added?

PROPOSED

NEW

WP2 STRUCTURE

Proposed new WP2 structure

- ◆ WP2 L: R. Tomás
- ◆ WP2 DL: E. Métral
- ◆ WP2 SS: N. Mounet and G. Skripka (to be replaced soon)
- ◆ Task 2.1: Optics and layout (R. De Maria)
- ◆ Task 2.2: Single-particle DA simulations (M. Giovannozzi)
- ◆ Task 2.3: Incoherent effects (G. Sterbini)
- ◆ Task 2.4: Coherent effects and impedances (X. Buffat)
- ◆ Task 2.5: Electron cloud effects (G. Iadarola)
- ◆ Task 2.6: Ion beam operation (R. Bruce)

- ◆ OMC => *Task? To be decided next year*

Next

◆ If/when approved

- Update of WP2 mandate (Rogelio and Elias)
- Each Task Leader to add their mandate on WP2 webpage (in the Tasks' links). Rogelio requested "contributor rights" for all Task Leaders => Should be OK now
- Each Task Leader to put the necessary / main information and links in their respective webpage and maintain it (for anybody to follow)

◆ Maintenance of the WP2 webpage (with all necessary info)

- Events and dates => Yearly (preliminary) planning seems useful, etc.
- Actions and their follow-up => Clear priorities to be put
- EDMS/ECR/Drawing => Clear procedure to be defined (Who? How?)
- Organization of the WP2 meetings
 - Every 2 weeks if possible and we will try and respect (as much as possible) the agenda => Allow more time for the talks for which we want more discussions (informative vs. brainstorming talks)
 - Natural evolution: more and more Joint meetings with other WPs
- WP2 attendance to other meetings (see slide 33)

Next

◆ OP scenario for protons operation

- 1st (2015): https://cds.cern.ch/record/2016811/files/CERN-ACC-NOTE-2015-0009_2.pdf
- 2nd (2018): <https://cds.cern.ch/record/2301292/files/CERN-ACC-NOTE-2018-0002.pdf>
- 3rd (2021?): New OP scenario to be discussed also today
(https://docs.google.com/document/d/1Fnu3rM3LTVI5rkgjj-VQW_Gq11V_P8rcP7Xv_jNp-I8/edit)

◆ OP scenario for Pb-Pb and p-Pb operation

- 1st (2020): <https://cds.cern.ch/record/2722753/files/CERN-ACC-2020-0011.pdf>

◆ Others? Please don't hesitate for any other input (now or in the future) which could help all of us to work in good conditions!

WP2 attendance to other meetings

- ◆ List started by Rogelio (<https://docs.google.com/spreadsheets/d/1O9JVe8kb-ARUvEh3Nr5RYXmq6SPMkxJ2f7bFVoabWo/edit?usp=sharing>)

1	Meeting	Direct contact	Secondary	Frequency	Reporting / Comment	Link
2	WP2	WP2	WP2	Biweekly	Minutes	https://indico.cern.ch/category/4094/
3	TCC	Rogelio	Elias, Riccardo, Massimo, Yannis, etc	Weekly	Internal distribution of highlights + Action	https://indico.cern.ch/category/11944/
4	HL Coordination	Rogelio	Elias, Roderik	Few meetings per year (check invitation)	Action follow-up	https://indico.cern.ch/category/4192/
5	PSM	Rogelio, Elias		2 meetings per year	Action follow-up	
6	EDQ	Rogelio, Ilias		Few meetings per year, plan to conclude in 2021	Document	https://indico.cern.ch/category/7932/
7	LMC	Yannis	Rogelio, Elias, Riccardo, Massimo, etc	Biweekly	Yannis distributes highlights to ABP SLs	https://indico.cern.ch/category/13477/
8	Layout	Riccardo	Rogelio	Monthly		https://indico.cern.ch/category/10417/
9	MCF (circuit)	Riccardo	Davide, Rogelio	Biweekly		https://indico.cern.ch/category/8387/
10	WP15 Integration	Riccardo	Roderik	Weekly		https://indico.cern.ch/category/11188/
11	WGA (alignment)	Massimo	Riccardo	Monthly		https://indico.cern.ch/category/9489/
12	Impedance WG	Benoit, Xavier	Nicolas, etc.		To be updated?	https://indico.cern.ch/category/8188/
13	WP3 (magnets)		Massimo, Riccardo, Rogelio	Biweekly	Frequent joint meetings	https://indico.cern.ch/category/7762/
14	WP4 (RF)		Rogelio, Elias, ?	Monthly	Frequent joint meetings	https://indico.cern.ch/category/5873/
15	WP5 (collUSM)	Stefano	Riccardo, Massimo, Benoit		Frequent joint meetings	https://indico.cern.ch/category/5696/
16	OMC	Tobias, Ewen	Rogelio, Riccardo, etc.	Weekly		https://indico.cern.ch/category/5986/
17	e-cloud	Gianni	Elias, ?			
18	WP8 (TAXS, TAXN)		Riccardo	Biweekly		
19	TREX	Benoit	Roderik, Stefano, ?			
20	WP13 (BI)		Riccardo		Frequent joint meetings	
21	Run 3	Yannis	Riccardo, Rogelio, Elias, Nicolas, Xavier...			
22	LSWG (LHC MDs)	?	?			
23	Beam-beam & lumi.	Guido & Ilias				

- **Direct representative** => Should attend the meeting and **pass the relevant info to WP2 team** (can be short) after the meeting
- If there is no "Direct contact" it is implied that the meeting only needs to be attended upon request

=> Let's finalize this list altogether (many thanks in advance!)

Many thanks to the previous team

and

good luck to the new one!