
WG4: Prospective observables in QCD

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Sources

- Useful input : GT03 – IN2P3 perspectives : Hadronic Physics - Understanding Strong Interaction

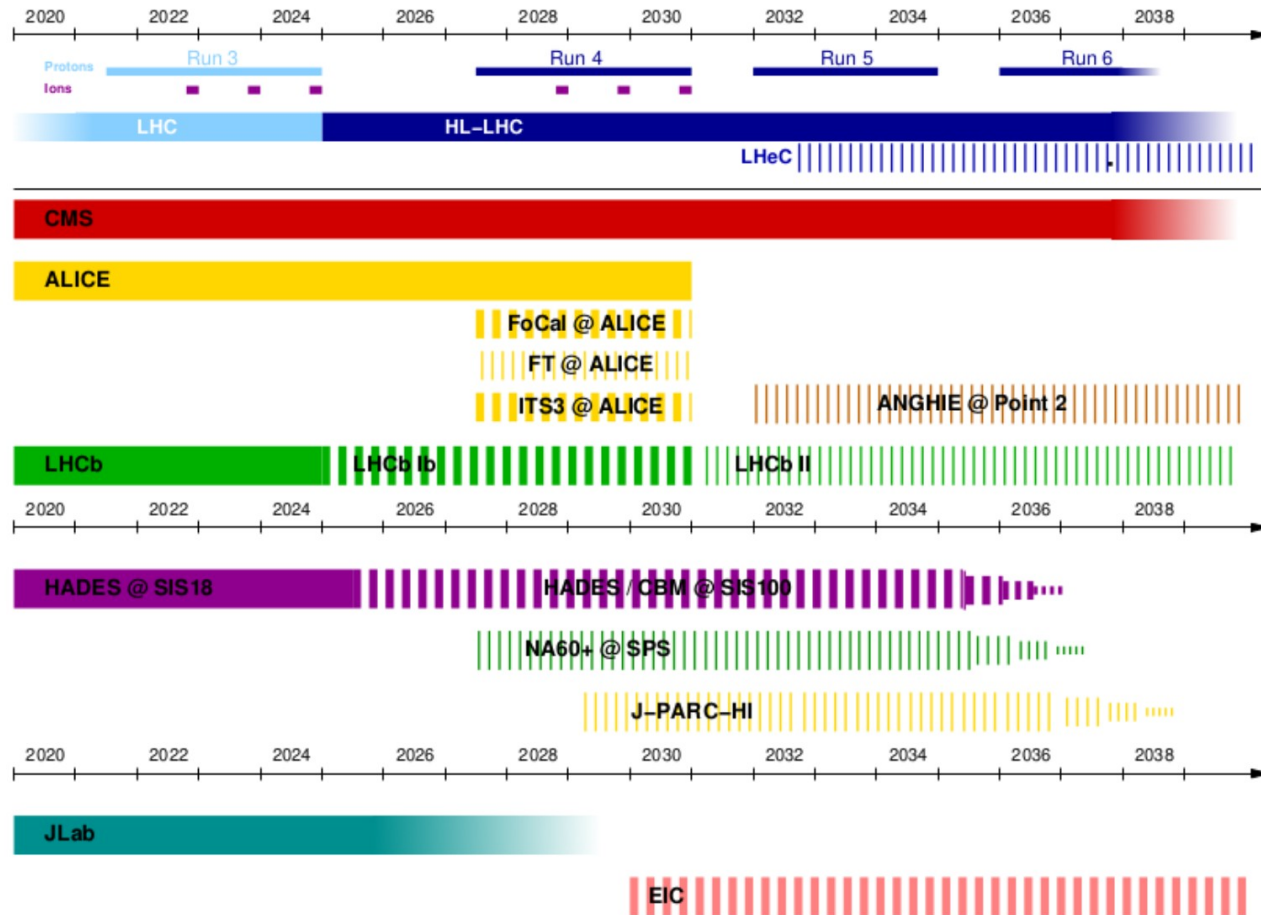
Report: <https://box.in2p3.fr/index.php/s/4AGQkZZPZoasTRR#pdfviewer>

Science drivers :

- Understanding the origin of the proton mass
- Mapping the structure of nucleons and nuclei
- Understanding the deconfined state of quarks and gluons
- Establishing the equation of state of strong interactions



Timeline of the main experiments



Exciting perspectives !

What do we want to do in WG4 ?

WG4 : Prospective **observables** in QCD

We want to :

- ❑ Focus on **probes** : dileptons, photons, jets, ...
- ❑ Explore the potential of the different experiments for measuring these probes
- ❑ Explore their scientific interest (theoreticians needed)

WG4 is transversal to the thematic WG

WG4 organization

~1 workshop per year focusing on a specific probe

→ Contact us if you want to propose a specific probe

We can also help to **organize discussions about observables**: contact us if

For **theorician** :

- ❑ You would like to **propose new observables**
- ❑ Looking for experimentalist to **evaluate the feasibility of your measurement**

For **experimentalist** :

- ❑ You can measure an observable
- ❑ Looking for theoreticians to **evaluate its scientific interest and make predictions**



WG4 in 2021 : Focus on dileptons

Workshop in November dedicated to dileptons : <https://indico.in2p3.fr/event/25089/>

The banner for the workshop includes the following elements:

- Logos for CNRS and GDR (Groupement de recherche QCD Chromodynamique quantique).
- The title "Chromodynamique quantique" in large white letters on an orange background.
- The subtitle "Prospects on various aspects of the dilepton probe in hadronic physics" in white text on a blue background.
- A search bar with the placeholder text "Enter your search term" and a magnifying glass icon.
- Four illustrative panels: 1) A colorful field of particles, 2) A hadron structure model with quarks and gluons, 3) A 3D grid with a central particle, and 4) A diagram of Wigner Distributions and Parton Distribution Functions.

What can we learn from dileptons measurements ?

- ✓ ~50 participants, mostly in person
- ✓ Bringing together different communities: Hadron structure, QGP, “cold QCD”, theory, ...

WG4 in 2021 : Focus on dileptons

Experimentalists : what do you measure ?

Theoreticians : what would you like experimentalists to measure with dileptons ?

Welcome	
<i>IJClab</i>	09:25 - 09:30
Studying QCD with the dilepton probe	<i>Samuel Wallon</i>
<i>IJClab</i>	09:30 - 10:10
Dilepton with CLAS	<i>Pierre Chatagnon</i>
<i>IJClab</i>	10:10 - 10:30
Perspectives EIC	<i>Daria Sokhan</i>
<i>IJClab</i>	10:30 - 10:50
Coffee break	
<i>IJClab</i>	10:50 - 11:10
TCS - theoretical point of view	<i>Jakub Wagner</i>
<i>IJClab</i>	11:10 - 11:30
UPC at the LHC	<i>Ms Aude Glaenger</i>
<i>IJClab</i>	11:30 - 11:50
Dilepton production in transport models	<i>Elena Bratkovskaya</i>
<i>IJClab</i>	11:50 - 12:10

Drell-Yan from theory to experiments	<i>François Arleo</i>
<i>IJClab</i>	13:40 - 14:00
Probing dense matter with the dielectron probe at HADES	<i>Tetiana Galatyuk</i>
<i>IJClab</i>	14:00 - 14:20
Dileptons with CMS	<i>Florian DAMAS</i>
<i>IJClab</i>	14:20 - 14:40
Dileptons with LHCb	<i>Manuel GUITTIERE</i>
<i>IJClab</i>	14:40 - 15:00
Coffee break	
<i>IJClab</i>	15:00 - 15:20
Intermediate mass dileptons as pre-equilibrium probes in HI collisions	<i>Maurice Coquet</i>
<i>IJClab</i>	15:20 - 15:40
Low mass dilepton with ALICE experiment, and NA60+ project	<i>Antonio Uras</i>
<i>IJClab</i>	15:40 - 16:00
High mass dilepton with ALICE	<i>Rita Sadek</i>
<i>IJClab</i>	16:00 - 16:20
High mass dilepton with ALICE3	<i>Raphaelle Bailhache</i>
<i>IJClab</i>	16:20 - 16:40

WG4 in 2022 : QCD in 2030s

2 days workshop in March dedicated to perspective in QCD in 2030 and beyond

- <https://indico.in2p3.fr/event/26055/>
- 58 participants, attendance mostly in person
- Focus on heavy flavours and quarkonia
- First day: theory perspectives
- Second day: experimental opportunities
- (CMS,LHCb, ALICE-3...)
- Extended time for round table discussions



The screenshot shows the Indico event page for "Prospectives en QCD au delà de 2030". The event is scheduled for 10-11 Mar 2022 at IJCLab (Orsay) in the Europe/Paris timezone. The page includes a search bar, a navigation menu with options like Overview, Timetable, Contribution List, Registration, Participant List, and Remote connection, and the GDR QCD logo (Groupement de recherche QCD Chromodynamique quantique). The event details state: "Le GDR QCD organise une discussion sur les prospectives dans le domaine au delà de 2030. L'événement aura lieu à IJCLab (Orsay) le 10 et 11 mars 2022. Les inscriptions sont maintenant ouvertes." The start and end times are 10 Mar 2022, 12:00 to 11 Mar 2022, 16:00, and the location is IJCLab (Orsay), Auditorium Pierre Lehmann (Bât 200).

WG4: plans

- Fall 2022: Seminar on Correlations in heavy ion collisions
- 2023
 - ~ Organization of one workshop. Two options under consideration
 - Workshop on a specific observable (jets, photons, ...)
 - Workshop on perspective 2030+, focus on EIC physics