INTENSITY frontier

GDR-InF

Coseil de Groupement
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Before we start

A big thanks to Aoife and Francesco for the past great job and for helping us in the transition

Conseil de groupement

Olivier Leroy (CPPM)
Jérôme Charles (CPT)
Marie-Hélène Schune (IJCLab-HEP)
Sébastien Descotes-Genon (IJCLab-Theory)
Nazila Mahmoudi (IP2I)
Isabelle Ripp-Baudot (IPHC)
Stéphane Lavignac (IPhT, CEA)
Stéphane T'Jampens (LAPP)
Björn Herrmann (LAPTh)
Olivier Deschamps (LPC)
Francesco Polci (LPNHE)
Christopher Smith (LPSC)
Mark Goodsell (LPTHE)

Thank you for your help and support!

Working groups & conveners

- Working Groups are crucial to the GDR, and it’s important that they represent correctly the topics relevant to the GDR

- So, let’s challenge together our proposed structure

What changed

- Changed two names to enlarge scope
  - CP violation -> Discrete symmetries
  - Heavy flavour production and spectroscopy -> Non-perturbative aspects

- Added Light new particles WG

From CdG 02/12/2020

WORKING GROUPS AND CONVENERS

CP violation:
Christopher Smith, Jean-Francois Marchand, Stephanie Roccia

Rare, radiative and semi-leptonic B decays, Charm and Kaon Physics:
Diego Guadagnoli, Justine Serrano, Carla Marin-Benito

Heavy flavour production and spectroscopy:
Benjamin Audurier, Michael Winn*, Emi Kou

Interplay of quark and lepton flavour:
Ana Teixeira, Yasmine Amhis, Peter Stangl*

Future experiments:
Mark Goodsell, Stephane Monteil, Giulio Dujany

*Stepping down Dec 2020
* New since Sept 2020

Working groups & conveners

- Rare, radiative and semi-leptonic B decays; Charm and Kaon Physics
  - Christina Agapopoulou, Jacopo Cerasoli, Nazila Mahmoudi, Olcyr Sumensari
- Non-perturbative aspects
  - Aoife Bharucha, Antoine Gérardin, Elisabeth Niel
- Interplay of quark and lepton flavour
  - Ana Teixeira, Laura Zani
- Light new particles
  - Mark Goodsell, Christopher Smith
- Discrete symmetries
  - Pierre Delahaye, Vincent Tisserand
- Future experiments
  - Benjamin Audurier, Dorothea vom Bruch

Rare, radiative and semi-leptonic B decays; Charm and Kaon Physics

Conveners: Christina Agapopoulou, Jacopo Cerasoli, Nazila Mahmoudi, Olcyr Sumensari

This WG broadly collects flavour-changing neutral-current decays, whether in the beauty, charm, or strange sector. FCNCs are well-known probes of new physics, because of the concurrence of several suppression mechanisms within the SM. For many of these modes one can take advantage of precise theoretical predictions and experimentally clean observables. The large dataset collected by the LHCb experiment is currently showing a coherent, persistent pattern of deviations with respect to the SM expectations in semileptonic $b \to s$ transitions, which clearly deserves further attention on both theory and experimental sides. The WG includes also kaons and charmed mesons, that have marked the origins of flavour physics. Renewed interest in the analysis of their decays is emerging, not only because they provide strong and complementary tests of new effects, but also because of novel experimental opportunities, as well as unprecedented lattice-QCD capabilities.

Admittedly, busy schedule (and sub-topics missing)

Non-perturbative aspects

Conveners: Aoife Bharucha, Antoine Gérardin, Elisabeth Niel

This WG includes aspects such as heavy-flavour production, spectroscopy, and the understanding and measurement of form factors. Not only do these subjects offer reference frameworks to test QCD predictions, but they provide crucial input needed for other measurements and for the interpretation of new-physics sensitive channels. Besides, the existence of exotic bound states of quarks such as tetra- and pentaquarks has now been established but they are not yet fully understood.

Challenge to find experimentalist convener based in France, but found perfect candidate extending the search among French former PhD students

Interplay of quark and lepton flavour

Conveners: Ana Teixeira, Laura Zani

Flavour violation in the charged lepton sector is a clear sign of new physics by itself, and many experiments are directly searching for it. Besides, the deviations from the SM observed in lepton universality tests of beauty-hadron decays calls for joint consideration of the quark and lepton sectors, where measurements are combined and theory aspects are developed concurrently.

WG with important overlap with the “rare” (and overloaded) WG

Light new particles

Conveners: Mark Goodsell, Christopher Smith

Light new particles are commonplace in SM extensions, e.g. as (near-)Goldstone bosons of hidden global symmetries. In such setup, they are actually messengers from *high-energy* physics. Besides, there is no fundamental reason why such particles should couple universally across the generations, or for their couplings to be flavour-diagonal. And besides, the strongest constraints, that come from astrophysics, occur for coupling to first-generation matter. Hence such particles may be as heavy as a MeV-GeV, and couple non-negligibly to heavier generations. All these considerations make flavour-physics experiments very suitable to probe this sort of new physics. The WG will likewise cover the vast landscape of non-flavour experiments also dedicated to the search of light new particles.

- No need to stress the current interest in light new boson searches.
- These searches also concerns colliders (e.g. flavoured axions).

Discrete symmetries

Conveners: Pierre Delahaye, Vincent Tisserand

Discrete symmetries such as parity and CP are broken in the SM. Broken discrete symmetries not only warrant interesting phenomenology — some of them are even necessary conditions for baryogenesis. CP violation in the quark sector has meanwhile provided a set of excruciating tests of the SM, through the measurement of the parameters of the CKM matrix at the B factories. LHCb and Belle II will actually be able to provide substantial new insights on the existing tests, and will be capable of additional ones, e.g. in B_s mesons and in b baryons. Other crucial, and complementary, tests of CP violation are provided by EDMs, whose experimental landscape is flourishing, with great opportunities for interdisciplinarity, and with France involved in a central way.

- Aim: cover very complementary aspects — all relevant to the intensity frontier— of current searches for the violation of discrete symmetries

Future experiments

Conveners: Benjamin Audurier, Dorothea vom Bruch

Experimental planning is crucial, especially at a time where future upgrades of the LHCb experiment as well as new experiments are being proposed. This GDR aims at playing a role in identifying priorities for the involvement of the French community. France is for example one of the founding countries of CERN, one of its largest contributors, and one of the most active communities within its premises.

GDR events (workshops, lectures, ...)

- They are the essence of the GDR, and we should exploit this opportunity
- They rely on the initiative of us all

GDR events this year

- Second lectures of the detectors series (following Tracking detectors and algorithms)

- The GDR annual meeting
  - We hope and expect to make it in-person.
    Proposals for the hosting place?
  - Important to work on the content from ASAP. We are pooling ideas.

(Ideas of further) GDR events, this year and the next

"Building-bridges" workshops (aka interdisciplinary short workshops)

We spend O(2 days) on subjects that bridge between two different research areas.

"The-chat" short workshops

Short, in-person meetings, where hot new results (both TH & EXP) are presented and discussed in an informal, flexible way (like a Journal Club)

Comments? More ideas?

(Ideas of further) GDR events, this year and the next

"Focus" or topical lectures

We invite experts on a technical subject which is of great current interest.

"The-basics" lectures

Devoted to the crucial tools for research in our field.

Comments? More ideas?

(Ideas of further) GDR events, this year and the next

"Supported workshops”

Workshops not organized directly but supported financially as relevant for the GDR in the spirit of avoiding duplication.

Comments? More ideas?

Budget

- The same of last year (23 k€)

Community tools

- Website: http://gdrintensityfrontier.in2p3.fr/
- Indico: https://indico.in2p3.fr/category/731/
- Mailing list: https://listserv.in2p3.fr/cgi-bin/wa?A0=GDR-INTENSITYFRONTIER-L
- Mattermost: https://mattermost.web.cern.ch/gdr-inf/channels/town-square

Please invite your new lab members to join!


One more thing...

Proposal for a GDR-InF thesis prize

- To promote the young scientists of the GDR
- Similar idea of what GDR QCD does (link)
- Tentative proposal
  - One prize per year
  - Nomination from GDR members
  - Light dossier
  - Jury of O(5) experts pooled from the GDR