

PBC virtual workshop, 1-4 March 2021
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PHYSICS BEYOND COLLIDERS RELOADED: EPPSU RECOMMENDATIONS & UPDATED MANDATE

Excerpt from the initial PBC mandate by CERN Management:

“Explore the opportunities offered by the CERN accelerator complex and infrastructure to address some of today’s outstanding questions in particle physics through experiments complementary to high-energy colliders and other initiatives in the world.”

pbc.web.cern.ch

Deliverables to EPPSU:

PBC Summary Report: [arXiv:1902.00260](https://arxiv.org/abs/1902.00260)

PBC BSM Report: [arXiv:1901.09966](https://arxiv.org/abs/1901.09966)

PBC QCD Report: [arXiv:1901.04482](https://arxiv.org/abs/1901.04482)

PBC Accelerator Reports:

<http://cds.cern.ch/collection/PBC%20Reports?ln=en>



PBC KICK-OFF WORKSHOP, CERN, September 2016

Call for abstracts → 20 selected for presentation

1st GENERAL WORKING GROUP MEETING, CERN, March 2017

Identification of main issues to be studied

2nd PBC WORKSHOP, CERN, November 2017

Working groups project reports

New call for abstracts → 7 selected for presentation

2nd GENERAL WORKING GROUP MEETING, CERN, June 2018

3rd PBC WORKSHOP: CERN, January 16-17, 2019

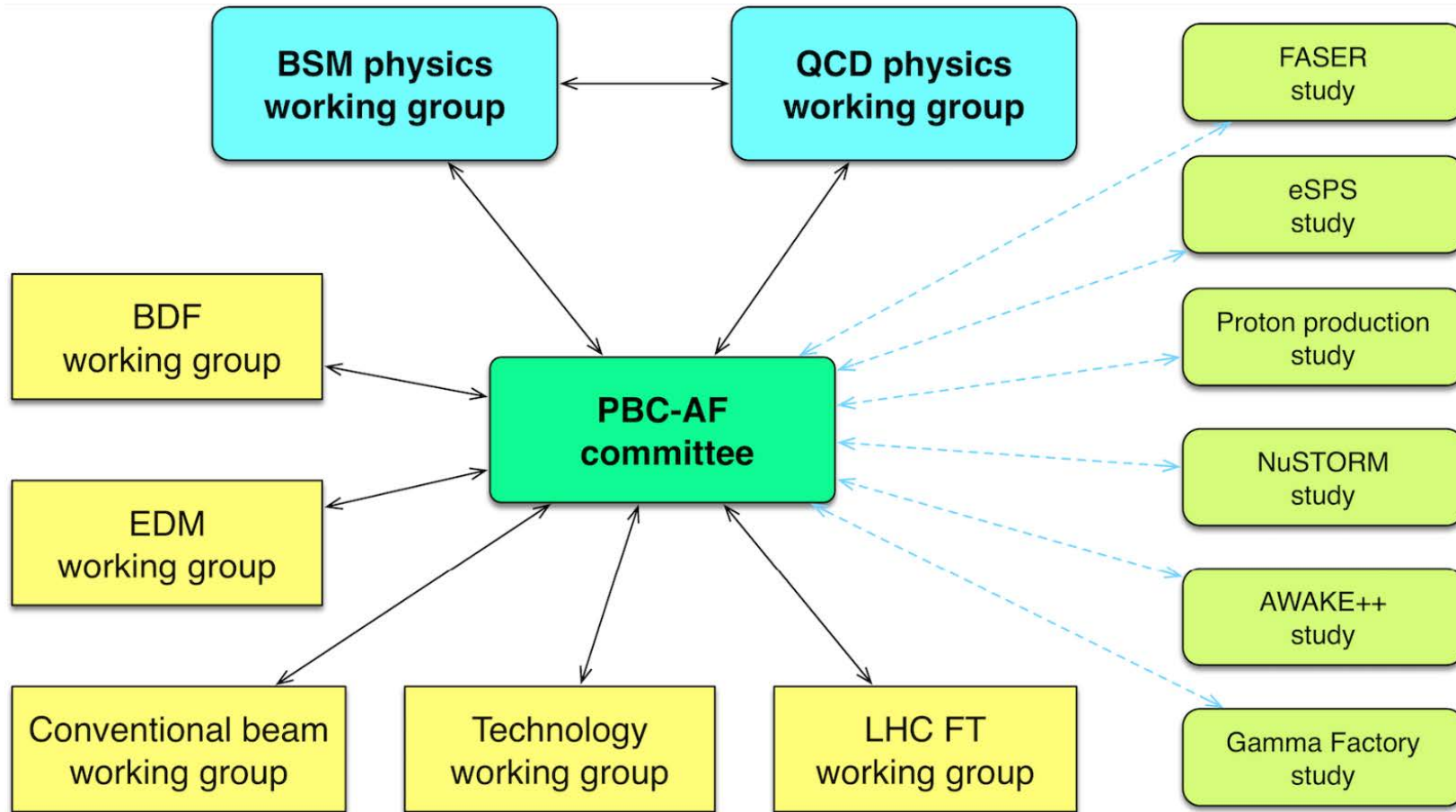
Summary of inputs to EPPSU and survey of future studies

3rd GENERAL WORKING GROUP MEETING, CERN, 5-6 November 2019

Updated status of projects before EPPSU drafting session

HISTORY OF PBC EVENTS

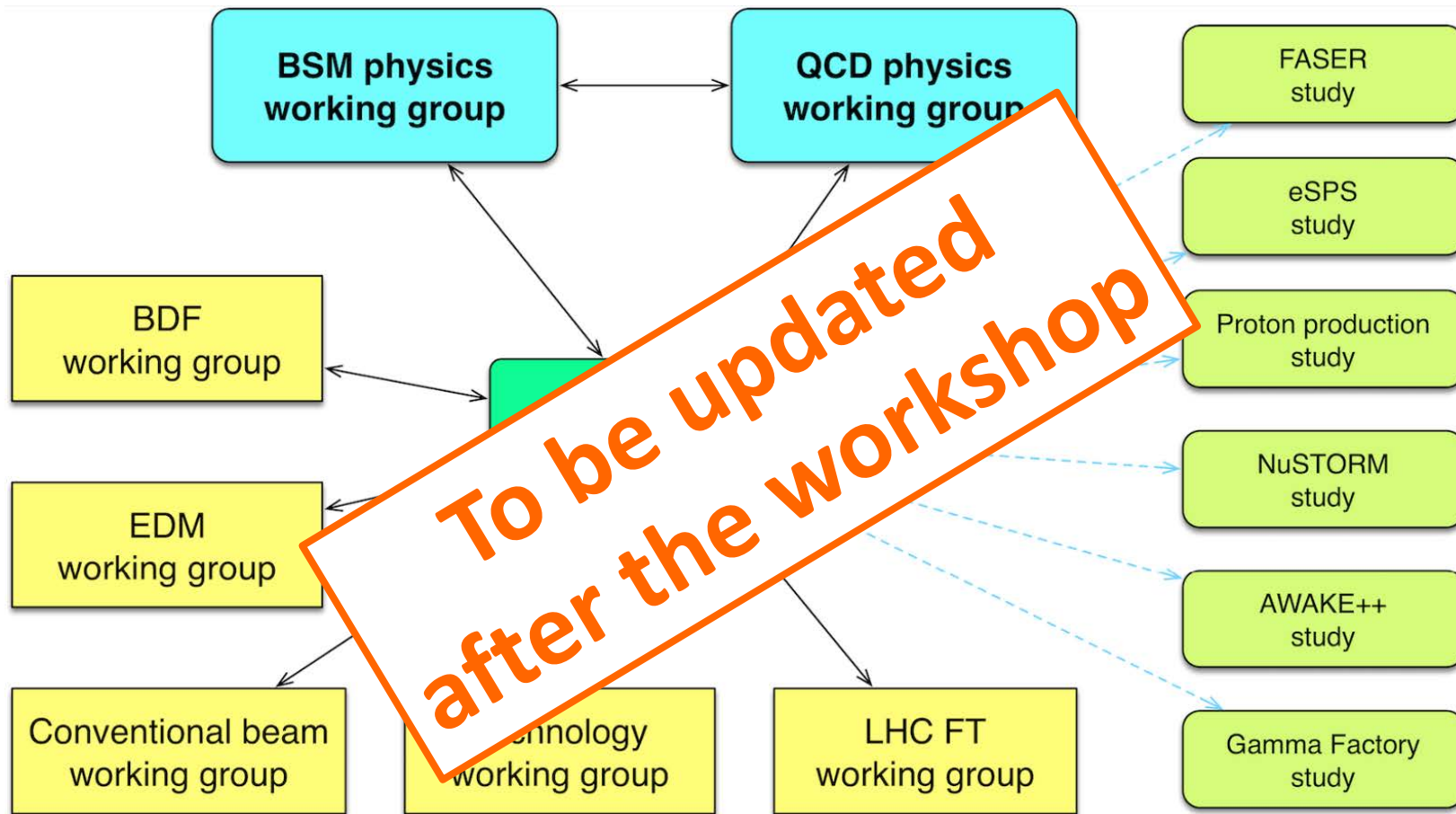
PBC CURRENT WORKING GROUP STRUCTURE



~100 core members in the Working Groups

Organisation and follow-up of activities documented on <http://pbc.web.cern.ch/>

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EPPSU DELIBERATION DOCUMENT

General statements of interest for PBC

...

A diverse programme that is complementary to the energy frontier is an essential part of the European particle physics Strategy. ***Experiments in such diverse areas that offer potential high-impact particle physics programmes at laboratories in Europe should be supported, as well as participation in such experiments in other regions of the world.***

...

The particle physics community must further strengthen the unique ecosystem of research centres in Europe. In particular, cooperative programmes between CERN and these research centres should be expanded and sustained with adequate resources in order to address the objectives set out in the Strategy update.

...

Synergies between particle and astroparticle physics should be strengthened through scientific exchanges and technological cooperation in areas of common interest and mutual benefit.

...

EPPSU DELIBERATION DOCUMENT

A few specific projects
mentioned...

...

These include measurements of electric or magnetic dipole moments of charged and neutral particles, atoms and molecules, rare muon decays with high intensity muon beams at PSI, FNAL and KEK, rare kaon decays at CERN and KEK, and a variety of charm and/or beauty particle decays at the LHC,

...

Accelerator-based beam-dump and fixed-target experiments can perform sensitive and comprehensive searches of sub-GeV dark matter and its associated dark sector mediators, complementary to high-energy colliders and other approaches.

...

Among the proposals for larger-scale new facilities investigated within the Physics Beyond Colliders study, the Beam Dump Facility at the SPS emerged as one of the frontrunners. However, such a project would be difficult to resource within the CERN budget, considering the other recommendations of this Strategy.

...

In addition to the examples already mentioned above, a broad programme of axion searches is proposed at DESY, a search for low-mass dark matter particles with a positron beam is under way at Frascati, and the COSY facility could be used as a demonstrator for measuring the electric dipole moment of the proton at Jülich. These initiatives should be strongly encouraged and supported.

...

The possible implementation and impact of a facility to measure neutrino cross-sections at the percent level should continue to be studied.

...

The design studies for next-generation long-baseline neutrino facilities should continue.

UPDATED PBC MANDATE

Scientific goal

The main goal of the Study Group remains to explore the opportunities offered by CERN's unique accelerator complex, its scientific and technical infrastructure, and its know-how in accelerator and detector science and technology, to address today's outstanding questions in particle physics through initiatives that complement the goals of the main experiments of the Laboratory's collider programme. Examples of physics objectives include dedicated experiments for studies of rare processes and searches for feebly interacting particles. The physics objectives also include projects aimed at addressing fundamental particle physics questions using the experimental techniques of nuclear, atomic, and astroparticle physics, as well as emerging technologies such as quantum sensors, that would benefit from the contribution of CERN competences and expertise. The study group will primarily investigate, and, where appropriate, provide support to, projects expected to be sited at CERN. The study group may also examine ideas and provide initial support for contributions to projects external to CERN. The study group is also expected to act as a central forum for exchanges between the PBC experimental community and theorists for assessment of the physics reach of the proposed projects in a global landscape.

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New ideas session

Quantum sensors session

FIPs introductory talk

UPDATED PBC MANDATE cont'd

Organization

The group will continue to be led by three coordinators representing the scientific communities of accelerator, experimental, and theoretical particle physics. The coordination team reports to the CERN Directorate. The coordinators will update the PBC working group structure to reflect the updated PBC mandate and input from the community.

The PBC study group will act as CERN's initial portal for new ideas which may come in spontaneously or through specific calls launched by the PBC coordination team. The group will facilitate and support an initial evaluation of the relevance and technical feasibility of the ideas in a global context, and will regularly inform the CERN scientific committees (INTC, SPSC or LHCC) about their findings. Where appropriate, oversight of PBC studies will be passed to the relevant CERN scientific committee once they are adequately mature for scrutiny and review of possible implementation.

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**We look forward to
the presentations
and
to your suggestions
in the outlook session!**

