



Workshop on Physics Program of the New QCD Facility at SPS (CERN) CERN 20/06/2018

Introduction

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New QCD facility at SPS (CERN) and the goal of the Workshop



1. Few years ago we decide to examine the perspectives for the NEW QCD Facility here at CERN at the extracted SPS secondary beams
2. We organize a series of Workshops in order to collect new ideas and attract new people
3. This initiative sort of anticipated the CERN Physics Beyond Colliders study group creation, we are active part of this group now

Two years ago we (COMPASS) decide to write a Letter of Intent for a New QCD Facility at CERN, **open for new ideas and participants**, with the final goal to submit it to CERN in the fall of 2018.

The main goal of this workshop is threefold:

- **Review and advertise the current content of Lol**
- **Call for new ideas**
- **Invite new participants**



New CERN SPS based QCD facility Letter of Intent



EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

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June 14, 2018

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Future QCD facility at M2 (CERN, SPS) beam-line

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Letter of Intent

First step: Internal circulation to the COMPASS Collaboration
of March 20th 2018



Lol content: Physics



6	1 Executive Summary	4	37	5.2 Spectroscopy of Kaons	41
7	2 Introduction	5	38	5.2.1 Physics Case	41
8	3 Hadron Physics with Standard Muon Beams	6	39	5.2.2 Previous Measurements	43
9	3.1 Proton radius measurement using $\mu - p$ elastic scattering	6	40	5.2.3 Novel Analysis Techniques	43
10	3.1.1 Experiments targeting the proton radius puzzle: the M2 beamline case	6	41	5.2.4 Future Measurements at COMPASS	44
11	3.1.2 Elastic lepton-proton scattering	8	42	5.2.5 Planed or Proposed Measurements at other Facilities	44
12	3.1.3 Measurement at CERN M2 beamline	9	43	5.3 Drell-Yan physics with high intensity kaon and antiproton beams	45
13	3.2 Exclusive reactions with muon beams and transversely polarized target	10	44	5.3.1 Nucleon spin structure with antiproton beam	45
14	3.2.1 Motivations for the GPD E measurement	10	45	5.3.2 Kaon valence distribution	47
15	3.2.2 Measurements of Deeply Virtual Compton Scattering	11	46	5.3.3 Kaon valence-sea separation	48
16	3.2.3 Measurements of Deeply Virtual Meson Production	13	47	5.3.4 The J/ψ production mechanism and the gluon distribution in the kaon	49
17	4 Hadron Physics with Standard Hadron Beams	15	48	5.3.5 Other experiments	50
18	4.1 Drell-Yan and charmonium production with conventional hadron beams	15	49	5.3.6 Run Plan: physics goals and required beam time	51
19	4.1.1 Introduction: Meson Structure and the Origin of Nuclear Mass	15	50	5.4 Study of gluon distribution in kaon via prompt photon production	51
20	4.1.2 Valence and sea separation in the pion	16	51	5.4.1 Gluon PDFs for mesons	51
21	4.1.3 J/ψ production mechanism and the pion gluon distribution	18	52	5.4.2 Prompt photons	51
22	4.1.4 Nuclear Dependence Studies: Flavour-dependent valence quark	20	53	5.4.3 Prompt photon production at COMPASS	52
23	4.1.5 Drell-Yan and J/ψ angular distributions	23	54	5.5 Primakoff Reactions	55
24	4.1.6 Run plan: physics goals and required beam time	23	55	5.5.1 Kaon polarizability	55
25	4.2 Spectroscopy with Low-Energy Antiprotons	24	56	5.5.2 Direct measurement of the lifetime of the neutral pion	56
26	4.2.1 Physics Case	24	57	5.6 Vector mesons production off nuclei by pion and kaon beams	57
27	4.2.2 Beam Line	27	58	5.6.1 Physics case	57
28	4.2.3 Measurements	28	59	5.6.2 The proposed measurement	59
29	4.2.4 Experimental Requirements	29			
30	4.3 Measurement of antimatter production cross sections for Dark Matter Search	31			
31	4.3.1 Physics Case	31			
32	4.3.2 Feasibility of the measurement at COMPASS	33			
33	4.3.3 Competition and Complementarity	38			
34	5 Hadron Physics with RF-Separated Beams	40			
35	5.1 Beam Line	40			

10 projects for the moment, at first stage we are going to use available hadron/muon beam, at the second – RF separated kaon and antiproton beam.

All beams we are going to use are unique worldwide



Lol content: Instrumentation



60	6 Instrumentation	60
61	6.1 Summary Table	60
62	6.2 General upgrades	60
63	6.2.1 Front-end Electronics and DAQ	60
64	6.2.2 Large-area PixelGEM detectors	61
65	6.2.3 Large-area multi-pattern gaseous detectors (MPGD)	62
66	6.2.4 CEDARs at high rates	62
67	6.2.5 Hadron PID perspectives: RICH	63
68	6.3 Specific upgrades	63
69	6.3.1 Overview	63
70	6.3.2 High-pressure hydrogen TPC for proton-radius measurement	64
71	6.3.3 Recoil detector with polarized target	67
72	6.3.4 Target spectrometer for spectroscopy with low-E antiprotons	68
73	6.3.5 Active absorber for Drell-Yan with RF-separated hadron beams	69
74	7 Schedule	71

It is difficult to give exact cost estimate right now: it stays in the range 10-20 MCHF

Program	Physics Goals	Beam Energy [GeV]	Beam Intensity [s^{-1}]	Trigger Rate [kHz]	Beam Type	Target	Earliest start time, duration	Hardware Additions
μp elastic scattering	Precision proton-radius measurement	100	$4 \cdot 10^6$	100	μ^\pm	high-pr. H2	2022 1 year	active TPC SciFi trigger silicon veto
Hard exclusive reactions	GPD E	160	10^7	10	μ^\pm	NH_3^\uparrow	2022 2 years	recoil silicon, modified PT magnet
Input for DMS	\bar{p} production cross-section	20-280	$5 \cdot 10^5$	25	p	LH2, LHe	2022 1 month	LHe target
\bar{p} -induced Spectroscopy	Heavy quark exotics	12, 20	$5 \cdot 10^7$	25	\bar{p}	LH2	2022 2 years	target spectr.: tracking, calorimetry
Drell-Yan	Pion PDFs	190	$7 \cdot 10^7$	25	π^\pm	C/W	2022 1-2 years	
Drell-Yan (RF)	Kaon PDFs Nucleon TMDs	~ 100	10^8	25-50	K^\pm, \bar{p}	NH_3^\uparrow , C/W	2026 2-3 years	"active absorber", vertex det.
Primakoff (RF)	Kaon polarizability & pion life time	~ 100	$5 \cdot 10^6$	> 10	K^-	Ni	n/e 2026 1 year	
Prompt Photons (RF)	Meson gluon PDFs	≥ 100	$5 \cdot 10^6$	10-100	K^\pm π^\pm	LH2, Ni	n/e 2026 1-2 years	hodoscope
K -induced Spectroscopy (RF)	High-precision strange-meson spectrum	50-100	$5 \cdot 10^6$	25	K^-	LH2	2026 1 year	recoil TOF forward PID
Vector mesons (RF)	Spin Density Matrix Elements	50-100	$5 \cdot 10^6$	10-100	K^\pm, π^\pm	from H to Pb	2026 1 year	

Table 5: Requirements for future programs at the M2 beam line after 2021. **Standard muon beams** are in blue, **standard hadron beams** in green, and **RF-separated hadron beams** in red.



LoI & Proposal timelines



- End of June: LoI available world wide, start of the promotion campaign. The goal is threefold:
 - to find new collaborators
 - to collect new ideas
 - to establish the priority list of all possible experiments
- September 2018 (tentatively): LoI submission to SPSC
- In parallel start of the Proposal preparation and New Collaboration formation
- End of 2019: Proposal submission to the SPSC in the end of 2019



New QCD Facility at SPS (CERN)
Mini Workshop on Physics Program
CERN, June 20th 2018, Bat 774/R-013, 2pm-6:30pm
<https://indico.cern.ch/event/737176/>



=== SESSION 1 = start at 14:00 ===

(chair: Gerhard Mallot)

05' Introduction

Oleg Denisov

10+5' Proton Radius measurement

Sebastian Uhl

10+5' Hard exclusive reactions

Nicole D'Hose

10+5' Antimatter production cross-section

Michela Chiosso

10+5' Spectroscopy with antiprotons

Johannes Bernhard

10+5' Pion-induced Drell-Yan

Vincent Andrieux

40' Round Table

Convention beams

COFFEE 30' (16:00)

=== SESSION 2 = start at 16:30 ===

(chair: Oleg Denisov)

10+5' RF-separated beams

Eva Montbarbon / Johannes Bernhard

10+5' Kaons /antiprotons induced Drell-Yan
and Prompt Photons production

Matthias Grosse Perdekamp

10+5' Kaon polarizability and pion life time

Jan Friedrich

10+5' Kaon-induced spectroscopy

Boris Grube

10+5' Instrumentation

Caroline Riedl

45' Round table

RF-separated beams



Thank you!