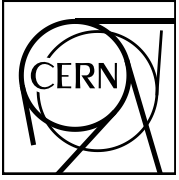


EHM kick-off meeting CERN, 11/12/2019

Next steps for the initiative:

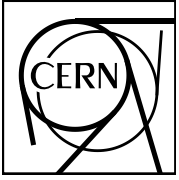
1. CERN/TH institute (3-5 days, March-April, CERN)
2. IWHSS (May 18-20, Trieste, Italy) – review talks
3. Fall 2020 – “full size workshop” prior to the COMPASS++/AMBER – Phase 2 Proposal submission



General Presentation

TH institutes are extended workshops intended to structure the TH visitor programme around topical themes. The ultimate aim is to make the best use of our resources and to share them with the community. We are also happy to coordinate our activities with those of other Institutes, Universities, or Research Centers whenever possible. The Institutes host programmes in HEP and related areas. While the organizers can be from anywhere outside CERN, there should be at least one local staff member in the organizing committee of the programme. This guarantees a smooth interaction with the CERN administration.

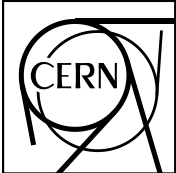
Reference person for us from TH side is Urs Wiedemann.



CERN TH department theory institute on EHM issue

After few iterations with Urs it was conformed that:

- TH has a dedicated budget to organize such a Theory institutes
- TH is in principle interested and available to organise AMBER-physics-program driven Institute
- Only theorist participating in this (normally 3-7 days long) event might be supported
- Support level is ~ 1KCHF per week
- Urs will try to identify TH people interested in this physics, in order to advertise an event he would need 1 page long summary containing:
 - The main purpose of the Institute
 - Which kind of physics it will be dedicated to
 - What are physics probes (processes) will be discussed at the workshop
 - List of possible participants (theory) from outside
 - Interest from CERN on experiment side



CERN TH department theory institute on EHM issue, summary

APPLICATION to hold an AMBER-driven THEORY INSTITUTE at CERN in early 2020

Perceiving the Emergence of Hadron Mass through AMBER@CERN

Outside co-chair: Craig Roberts, Head, Institute for Non-perturbative Physics, Nanjing University

AMBER organizing team: Oleg Denisov, Jan Friedrich, Catarina Quintans, Wolf-Dieter Nowak

Envisaged date: March 30-April 3, 2020

Scientific Motivation

The origin for the vast majority of visible mass in the Universe is still unknown, a fact that is often referred to as the conundrum of “Emergence of Hadron Mass”. Contrasting to the massiveness of the proton, the pion appears as unnaturally light, although both are of composite nature. The mass of the proton sets a scale for strong interactions that finds no parallel in QED, and its magnitude can by far not be explained by the Higgs boson. The physics mechanism responsible for the generation of mass is the dynamical breaking of the scale invariance in Quantum Chromodynamics.

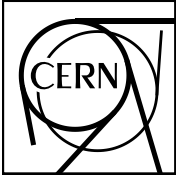
Quarks and gluons are predicted to dynamically acquire mass, the only massless systems in QCD being its composite Nambu-Goldstone bosons, the pions. Thus no true understanding of the large proton mass can be achieved without simultaneously addressing the nearly masslessness of the pion. The kaon, on the other hand, is of particular interest, since the strange quark mass sets a critical boundary, at which the strong mass generation and the Higgs mechanism contribution have similar strength.

Measurements sensitive to such parton-dressing effects, described by e.g. the parton distribution functions, allow for the study of the mechanism of hadron-mass generation. PDFs are non-perturbative objects describing hadron bound states, which can be experimentally accessed via deep inelastic scattering, by pion and kaon-induced Drell-Yan interactions, Charmonium production at moderate energies and hadro-production of direct photons.

Remarkable progress was achieved over the last decades in the field of continuum and lattice QCD calculations of meson PDFs. The resulting predictions from these various approaches require confrontation to accurate experimental data, like those that would become available at the AMBER experiment that was very recently proposed at CERN. Thirty years after the first experimental results on the pion valence structure became available, the information concerning the separation of valence and sea PDFs of the pion remains scarce, and there exists only one low-statistics measurement of the kaon-to-pion structure functions ratio. The prospects opened by the AMBER proposal provide now the opportunity for reviewing the present theoretical understanding of the Emergence of Hadron Mass, in order to harden and extend the list of experimental observables accessible at AMBER.

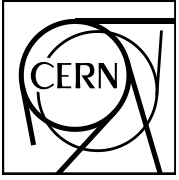
The proposed CERN Theory Institute will join theorists from nuclear and high-energy physics, in a dialogue with the experimentalists, addressing the origin of hadron masses. Modern approaches to this topic shall be discussed, including their applicability and limitations, the predictions available, and the direct correlations between hadron properties, meson PDFs in particular, and the observables needed to access them. The workshop is meant to start a collaborative effort between the experimentalists proposing this new measurement campaign, the phenomenologists doing global data analyses for parton distributions, and hadron-structure theorists.

This 5-days workshop is planned to count about 30 participants presenting their work. Dedicated panel discussions shall be organized at each day. Informal proceedings shall be compiled after the workshop.



CERN TH department theory institute on EHM issue, tentative list of participants (theory)

Arbusov Andrey	arbusov@theor.jinr.ru	JINR (Dubna)	Jorge Segovia	jsegovia@upo.es	Universidad Pablo de Olavide, Sevilla
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Barabara Pasquini	barabara.pasquini@pv.infn.it	INFN (Pavia)	Bastian Kubis	kubis@hiskp.uni-bonn.de	University of Bonn
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Cedric Mezrag	cedric.mezrag@cea.fr	IRFU, CEA, Universite Paris-Saclay	Norbert Kaiser	nkaiser@ph.tum.de	TUM (Munich)
Craig Roberts	cdroberts.inp@gmail.com	Nanjing University	Nobuo Sato	nsato@jlab.org	JLab
Chao Shi	cshi@nuaa.edu.cn	Nanjing University	Peter Schweitzer	peter.schweitzer@phys.uconn.edu	University of Connecticut
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			Xingbo Zhao	xbzhao@impcas.ac.cn	CAS IMP Lanzhou
			Shu-Sheng Xu	xuss@njupt.edu.cn	Nanjing University, Nanjing



IWHSS May 18-20, Trieste, Italy

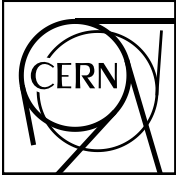
COMPASS++
AMBER



**IWHSS2020 and COMPASS Collaboration Meeting Trieste,
May 18-22, 2020**

COMPASS Collaboration Board Meeting
November 28, 2019

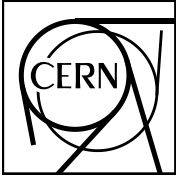
Anna Martin and Trieste Group



Fall 2020, EHM full size workshop

A full size EHM workshop will take place in Fall 2020, prior to the Submission of the COMPASS++/AMBER Phase-2 Proposal (tentative submission dead-line is end of 2020).

- Location still to be defined (CERN, Les Houches (Mont Blanc, France), Trento (Italy), Torino (Italy).....)
- A most probable time interval: September-October 2020
- Many organizational aspects depends on how far we will get in the Next 8-9 months.



SpareS