



Report on European Particle Physics Strategy input from Hadron Physics

Jahresversammlung der KHuK Mitglieder
6. Dezember/7. Dezember 2018

Frank Maas, HI Mainz, GSI, JGU

EPPS update process



Key objectives set by Council

- Deliver by May 2020 an update of the European Strategy for Particle Physics in a global context (decision of Council, December 2016)
- This strategy or vision will thereafter be a roadmap for funding agencies and laboratories to define concrete research programmes

EPPS update process

General considerations by the Strategy Secretariat:

- The Strategy Update process follows a bottom-up approach
- To facilitate the bottom-up approach an Open Call for input reaching out to all members of the particle physics community is issued; including research groups, research networks or collaborations, laboratories, universities, (inter)national institutions and/or organisations.
- The aim is to gather all relevant input, e.g. on scientific projects, position papers, national roadmaps, etc.
- The concrete scientific input will be considered by the Physics Preparatory Group (PPG) towards the organisation of the Open Symposium and to deliver the Physics Briefing Book.
- Other inputs will be consider by the European Strategy Group (ESG) to draft the Strategy Update.

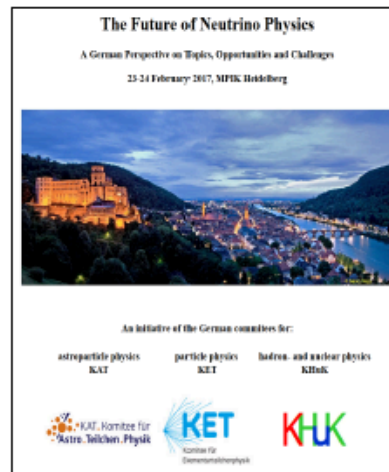
**Pragmatically, general guidelines are provided to facilitate both the collection of the input and its use by the PPG and the ESG;
i.e. be brief, comprehensive and self-contained.**

KET, KHuK, KAT Workshops

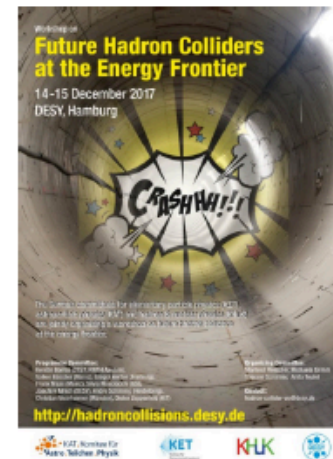
2./3. Mai 2016



23./24. Februar 2017



14./15 Dezember 2017



27./28. April 2017

The Future of Non-Collider-Physics

27-28 April 2017
Helmholtz Institute
Cologne/Bonn

Overview
Timetable
Registration
Participant List
Venue and Directions

The Future of Non-Collider Physics

A German Perspective on Topics, Opportunities and Challenges

This workshop is a joint initiative of the German committees of astroparticle physics (KAT), elementary particle physics (KET), and nuclear and hadron physics (KHuK). The aim of the workshop is to formulate a German strategy and prioritisation of future non-collider physics projects with substantial German participation. This will serve as preparation for a new European strategy which should emerge in 2018/2020.

Contact:
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Starts 27 Apr 2017 11:30
Ends 28 Apr 2017 18:30
Europe/Berlin

Helmholtz Institute
Conference Room, Groundfloor
Steudingerweg 18
55128 Mainz
Germany

3./4. Mai 2018

Strategieworkshop Teilchenphysik

Zukunftsperspektiven für die Forschung im Bereich der Elementarteilchen-, Astroteilchen-, Hadron- und Kernphysik

3-4 May 2018
Universitätsclub Bonn
Europe/Berlin

Overview
Timetable
Registration
Participant List
Venue/Accommodation /Travel
Dinner

<https://indico.desy.de/indico/event/19892/picture/3.jpg>

Der Workshop soll die Ergebnisse der vier vorangegangenen Strategieworkshops von KET, KAT, KHuK

KET Workshop on Future e+e-Colliders

The Future of Neutrino Physics

Workshop on Future non-Collider Projects

Workshop on Future Hadron Colliders at the Energy Frontier

zusammenfassen, aktualisieren und diskutieren.

Ziel ist der Entwurf von Empfehlungen für die Aktualisierung der European Strategy for Particle Physics.

Support
deach@uni-bonn.de

20.09.2018

Ergebnisse aus Sicht der KHuK-Community (1)

- Voraussetzungen:
 - KHuK Physik spannt einen weiten Bereich, Kernstruktur, Schwerionen, Struktur und Spektroskopie von Hadronen, Großgeräte, Theorie, Fundamentale Symmetrien: Nicht eine einzige Sonde oder Maschine, die alle Längenskalen abdeckt
 - Nicht eine einzige Förderstruktur, die alles abdeckt.
 - Strategieprozess im Rahmen von NUPECC: 27. November in Brüssel, „FAIR ESFRI Landmark“
 - **KHuK-Empfehlungen aktualisiert Anfang 2018**
- Ausbau von FAIR
- Betrieb laufender Anlagen: CERN: LHC-ALICE, COMPASS, ISOLDE, GSI, ELI, MAMI, ELSA, MESA, BES-III, etc.
- Förderung des Nachwuchses
- Interessante Zukunftsperspektiven

Ergebnisse aus Sicht der KHuK-Community (2)

- Neutrino Workshop: Input von der Kernstruktur notwendig
- Non-Collider Workshop: Konzentration der deutschen KHuK community auf den Aufbau der FAIR Experimente für NUSTAR, PANDA, HADES/CBM
- Test des Standardmodells mit Kernphysikalischen Methoden: Doppelter Betazerfall, EDMs, Paritätsverletzende Elektronstreuung, etc.
- Collider Workshop: Langfristig (Nach 2025-2030) Beteiligung am EIC in den USA, starke europäische Beteiligung, Transfer von FAIR-Detektortechnologie
- Townmeeting im Oktober und November der europäischen Schwerionencommunity und Hadronphysik zur Vorbereitung des ESFRI Strategieprozesses.

Allgemeines

- Für fast alle Projekte ist erhebliches FuE für eine Realisierung notwendig
 - Beschleunigertechnologie
 - Detektortechnologie
 - Computing und Software
- Fortschritte in den theoretischen Berechnungen
 - Starke Unterstützung der Theorie notwendig
- Sorge bereiten die zum Teil sehr langen Zeitskalen
 - Erheblicher Know-How Verlust droht
 - Perspektiven für Nachwuchswissenschaftler schwierig abschätzbar → Statement von yHEP

- Common final document from the summary workshop
- KET extracted its own input to EPPS
- Town meeting of Heavy Ion Physics, October 24 at CERN

<https://indico.cern.ch/event/746182/>

- Working group for hadron physics:
 „Workshop on Future opportunities in Hadron Physics for the European Particle Physics Strategy Process“, November 20/21 in Mainz

<https://indico.him.uni-mainz.de/e/eustra>

- Avoid inconsistency with previous documents from the community
 - Final documents recommendations from the common KET, KAT, KHuK workshops
 - KHuK updated recommendations
 - NuPECC Long Range Plan recommendations
- Authors: Working group
- More than just KHuK view, european level

- Goal: recommendations

Authors of the working group

J. Friedrich (TUM), W. Gradl (JGU), S. Lange (JLUG),
M. Lorenz (JWGUF), M. Lutz (GSI), F. Maas (HIM), U.
Marconi (INFNB), L. Pappalardo (UF), S. Paul (TUM),
M. Peardon (TCD), K. Peters (GSI), A. Schäfer (UR), H.
Ströher (FZJ), U. Uwer (UHD)



Program Hadron Physics

Workshop on Future opportunities in Hadron Physics for the European Particle Physics Strategy Process

Tuesday 20 November 2018

Coffee - Conference Room, Groundfloor (09:30-10:00)

Welcome and Introduction: F. Maas (HIM, JGU, GSI) (10 + 5 min) - Conference Room, Groundfloor (10:00-10:15)

Hadron Physics from the lattice: M. Peardon (TCD) (20 + 10 min) - Conference Room, Groundfloor (10:15-10:45)

Opportunities In Hadron Physics: M. Lutz (GSI, TU Darmstadt) (20 + 10 min) - Conference Room, Groundfloor (10:45-11:15)

Physics with an Electron Ion Collider: A. Schäfer (Regensburg) (20 + 10 min) - Conference Room, Groundfloor (11:15-11:45)

Hadron Physics with a fixed target at LHC: L. Pappalardo (Ferrara) (20 + 10min) - Conference Room, Groundfloor (11:45-12:15)



Program Hadron Physics

Hadron Physics at LHCb: Ulrich Uwer (Heidelberg) (20+10 min) - Conference Room, Groundfloor (13:45-14:15)

Hadron Physics from Heavy Ion Reactions In ALICE, CBM and HADES: M. Lorenz (GSI) (20 + 10 min) - Conference Room, Groundfloor (14:15-14:45)

Hadron Physics with Muon and Hadron beams at Cern (COMPASS++): Jan Friedrich (TUM) (20 + 10 min) - Conference Room, Groundfloor (14:45-15:15)

Hadron Physics at PANDA: K. Peters (GSI) (20+10 min) - Conference Room, Groundfloor (15:15-15:45)



Program Hadron Physics

Hadron Physics at a Tau-Charm-Factory In China: W. Gradl (JGU) (20 + 10 min) - Conference Room, Groundfloor (16:45-17:15)

Hadron Physics from BELLE-II In Japan: S. Lange (Glessen) (20 + 10 min) - Conference Room, Groundfloor (17:15-17:45)

Measurement of a charged particle EDM at CERN: H. Ströher (20 + 10 min) - Conference Room, Groundfloor (17:45-18:15)

Hadronic quantum corrections for the muon (g-2) : U. Marconi (Bologna) (20 + 10 min) - Conference Room, Groundfloor (18:15-18:45)

Wednesday 21 November 2018

Discussion and editing the Text - Conference Room, Groundfloor (09:00-10:30)

Coffee break - Conference Room, Groundfloor (10:30-11:00)

Discussion and editing the Text - Conference Room, Groundfloor (11:00-12:30)

Lunch break and End of the meeting - Conference Room, Groundfloor (12:30-13:30)

Recommendations for Hadron Physics

- Text is still work in progress
- Short introduction, no lengthy description of physics
Hadron Physics is a field with many probes, many diverse experiments, different energy scales, light quarks , medium heavy quarks, heavy quarks etc.
- Not one single facility or experiment can answer the big questions of the field
- Advancement in theory and experimental techniques: entering precision
- Study of systematic errors important both in theory and experiment

Recommendations for Hadron Physics

- Categories for projects:
 - Running or Approved („NuPECC: emerging“)
 - Projects mature enough to be recommended
 - Projects for which R&D can be recommended
- **Define clear priorities**

Recommendations for Hadron Physics

- Running and approved facilities for hadron physics
 - ELSA, DAPHNE, GSI, MAMI, PSI
 - ALICE, COMPASS, LHCb at CERN
 - HADES@GSI, CBM@FAIR, PANDA@FAIR
 - SuperKEKB, BEBPC-II
 - (no prioritisation, alphabetical order)
- Future projects (prioritised):
 1. Full completion of FAIR
 2. EIC in the US
 3. R&D for QCD facility with kaon and muon beams (COMPASS++)
 4. R&D for Super-tau-charm facility
 5. R&D for Fixed target program at LHC

Recommendations for Hadron Physics

- Beyond Standard Model Physics with Methods of Hadron Physics (no priorities)
 - Continued R&D for Storage Ring EDM
 - R&D for MuonE (hadronic corrections for $g-2$ of muon)
 - Realisation BSM-search at MESA (BDX, P2)
- More generic recommendation à la KET:
 - Theory
 - Advances in Technology
 - Accelerators
 - Detectors
 - Computing
 - Perspectives for young researchers