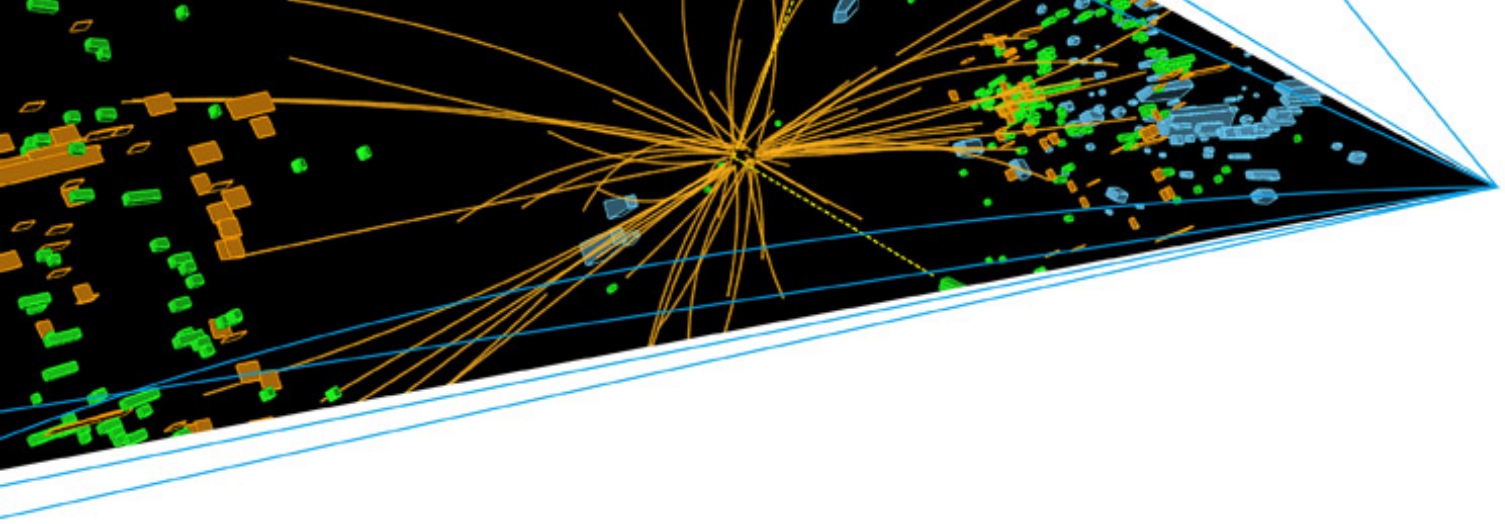


KET
Komitee für
Elementarteilchenphysik

KET-Aktivitäten

C. Zeitnitz für das KET

- KET-Wahl 2018
- Strategie
- Querschnittsthema: Software&Computing

Das Komitee für Teilchenphysik (2018-2021)

M. Beneke, V. Büscher, F. Ellinghaus, M. Elsing, E. Garutti, M. Kobel, J. List, U. Uwer, G. Weiglein, S. Bethke (Council), T. Hebbeker (DPG), A. Caldwell (MPG), J. Mnich (DESY), P. Schleper (RECFA)

Ständige Gäste: Vertreter von KAT, KHuK, KfB, yHEP

KET-Wahlen 2018

- Gewählt als Mitglieder des Komitees für Teilchenphysik sind
  - E. Garutti (Hamburg), F. Ellinghaus (Wuppertal), V. Büscher (Mainz), M. Kobel (Dresden), U. Uwer (Heidelberg), M. Elsing (CERN), J. List (DESY), G. Weiglein (DESY), M. Beneke (München)
- Ex-officio Mitglieder
  - S. Bethke (Council), K. Desch (Gutachterausschuss), T. Hebbeker (DPG), A. Caldwell (MPG), J. Mnich (DESY), P. Schleper (RECFA)
- Leitung
  - Vorsitzender: Ulrich Uwer
  - Stellvertreter: Volker Büscher
- Amtszeit des neuen KET
  - 17. November 2018 bis zur Jahresversammlung 2021

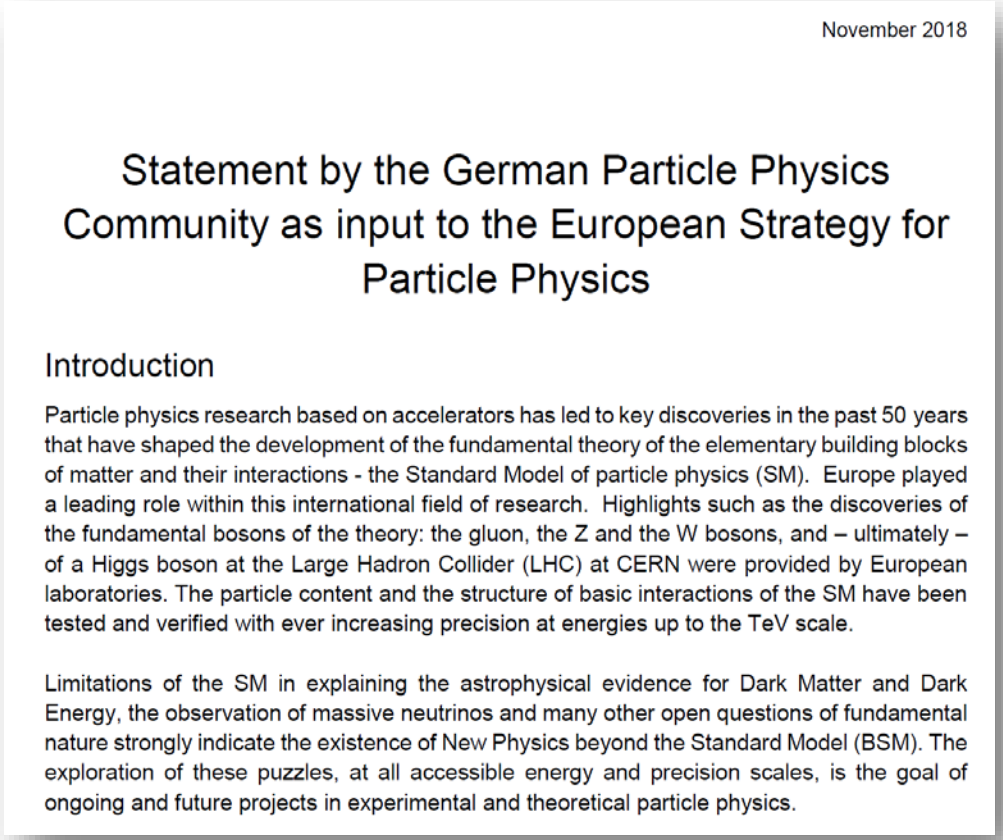
Strategieentwicklung

- Was soll geklärt werden
  - Welche physikalischen Fragestellungen sollen angegangen werden?
  - Was sind die nächsten Projekte der Teilchenphysik?
  - Priorisierung der Projekte
- Beteiligung der Community – Workshopserie über 2 Jahre
  - KET Workshop on future e^+e^--Collider (Mai 2016 in München)
  - Future of Neutrino Physics (Februar 2017 in Heidelberg)
  - Future non-Collider Projects (April 2017 in Mainz)
  - Future Hadron Collider (14./15. Dezember 2017 am DESY)
  - Strategieworkshop Teilchenphysik (3./4. Mai 2018 in Bonn)

  Bis auf ee-Collider Workshop, zusammen mit KAT und KHuK durchgeführt
- Abschlussdokument des Bonn Workshops fasst 2 Jahre Arbeit zusammen
- European Strategy Process startet 2019 und endet im Mai 2020
  - Nächste Veranstaltung: Scientific Open Symposium, 13. – 16. Mai 2019, Granada

Eingabe zum European Strategy Process

- Auf Basis des Abschlussdokuments des Bonn Workshops wurde ein Entwurf erstellt
- Entwurf wurde bei der KET Jahresversammlung diskutiert und verabschiedet
- Nach sprachlicher Überarbeitung liegt das 4-seitige Dokument jetzt vor



November 2018

Statement by the German Particle Physics Community as input to the European Strategy for Particle Physics

Introduction

Particle physics research based on accelerators has led to key discoveries in the past 50 years that have shaped the development of the fundamental theory of the elementary building blocks of matter and their interactions - the Standard Model of particle physics (SM). Europe played a leading role within this international field of research. Highlights such as the discoveries of the fundamental bosons of the theory: the gluon, the Z and the W bosons, and – ultimately – of a Higgs boson at the Large Hadron Collider (LHC) at CERN were provided by European laboratories. The particle content and the structure of basic interactions of the SM have been tested and verified with ever increasing precision at energies up to the TeV scale.

Limitations of the SM in explaining the astrophysical evidence for Dark Matter and Dark Energy, the observation of massive neutrinos and many other open questions of fundamental nature strongly indicate the existence of New Physics beyond the Standard Model (BSM). The exploration of these puzzles, at all accessible energy and precision scales, is the goal of ongoing and future projects in experimental and theoretical particle physics.

ESPP-Dokument

- Aus der Einleitung

> The German Committee for Particle Physics, KET, arranged, jointly with the Committees of the neighboring fields for astroparticle physics, KAT, and for hadronic and nuclear physics, KHuK, a series of workshops where the current status and future plans for the wider scientific field were evaluated and discussed. KET has extracted central statements and strategic proposals from the joint declaration and hereby submits them to the 2020 update of the European Strategy for Particle Physics.

- Meinung des KET
  - Dokumente der drei Communities sollten bei unterschiedlicher Schwerpunktsetzung so kohärent wie möglich sein (widerspruchsfrei)
  - Allgemeine Statement könnten sehr ähnlich oder identisch sein
    - Aussagen zur Theorie, Infrastruktur, R&D, Nachwuchsförderung, Outreach

Empfehlungen

- Wenige knappe Empfehlungen zu den Gebieten:
  - Running and approved collider projects
  - Future Collider Projects
  - Future non-collider projects
  - Accelerator based neutrino projects
  - Theory
  - Technology
  - Research infrastructure
  - Research conditions – promoting young scientists
  - Outreach

Running and approved Collider Projects

The physics potential of the experiments at the LHC and its upgrade, the HL-LHC, as well as at SuperKEKB must be fully exploited.

These projects provide now, and for the medium-term, the energy-, luminosity- and precision-frontier of high energy particle physics. Operation of the LHC has already been a great success with the Higgs boson discovery being the most visible example. Its high luminosity upgrade, the HL-LHC, will yield at least an order of magnitude more data recorded with significantly improved detectors. Belle II will complement the physics reach of the LHC through its access to rare processes in a particularly clean environment. The excellent discovery potential of these projects, both through precision measurements and through the search for new particles, must be fully exploited. The results acquired will provide insight for the planning of upgrades beyond the approved program as well as for future collider projects and their optimal specifications.

Future Collider Projects

An electron-positron collider, upgradeable to a centre-of-mass energy of at least 500 GeV, should be realised, with the highest priority, as the next international high-energy project.

The physics case for such a project is well defined and underlined by the state-of-the-art results from collider experiments. The SM, and possible deviations from it, will be probed to unprecedented precision with an electron-positron collider by operating it as a Higgs factory and by studying the top quark, W and Z boson production, and the Higgs potential.

We strongly support the Japanese initiative to realise, as an international project in Japan, the ILC as a "Higgs-Factory" with an initial centre-of-mass energy of about 250 GeV.

An energy of 250 GeV is regarded to be appropriate for an initial precision Higgs program. Concurrent running with the HL-LHC is highly desirable. Upgradeability to 500 GeV and beyond should be foreseen from the beginning.

Continuation of the development of accelerator and detector technologies and studies for a next-generation hadron collider, at the highest possible centre-of-mass energies beyond the LHC, should be pursued with high priority.

Hadron colliders explore the highest energies in direct searches for BSM physics. Theoretical guidance and experimental evidence for optimal specifications of a future hadron collider are currently not available. They are expected to emerge from ongoing and future projects and from theoretical developments. New insights may well allow to discriminate between the two scenarios that have been evaluated most thoroughly in Europe: the high energy (HE-)LHC, offering up to 27 TeV p-p centre-of-mass energies, and the FCC-hh (up to 100 TeV). Further development of required technologies, such as of high-field superconducting bending magnets, is recommended with high priority. A heavy flavour program at high energy hadron colliders should be pursued. Design studies of complementary collider options or extensions, for example a next generation high energy lepton-hadron collider, are supported.

Future non-Collider Projects

Experiments searching for WIMPs and axion-like particles, and experiments searching for light very weakly interacting particles at a high-intensity proton beam-dump are strongly recommended.

Experiments using natural particle sources or performed at accelerators in fixed-target or beam-dump setups are able to address fundamental questions that are complementary to collider experiments. Various SM problems are addressed by BSM theories predicting very weakly interacting particles (neutral leptons, dark photons/scalars, ALPs, WIMPs, but also light dark matter). The German particle physics community is particularly interested in the experiments IAXO at DESY, SHiP at CERN's SPS and DARWIN.

Advances in Technology

Research and development in accelerator and detector technologies, as well as in computing and software, are a prerequisite for all future projects.

Many of the topics and projects discussed above require substantial developments in the areas of accelerator, detector, computing and software technology. Examples in accelerator R&D are high field magnets, energy recovery structures and plasma wake field acceleration. Examples in detector R&D are extremely fast, radiation hard and cost-effective detectors with high granularity. Unprecedented data rates and volumes will require the exploitation of state of the art computer science methods to develop adequate computing concepts and innovative algorithms for data handling, reconstruction and analysis. Due to the very long time scales of many of the currently proposed projects, it will be essential to keep and further develop the technological expertise within the community.

Research Infrastructure

CERN must maintain its leading role in particle physics, and further develop its potential. This requires the continued close collaboration with national laboratories, institutions and universities.

The large-scale projects of particle physics build on infrastructures that are only available in the major international and national laboratories. For particle physics in Germany, DESY and its infrastructure are of particular importance. The success of experiments and the progress in theoretical particle physics depend decisively on collaboration on the international and national level. The further development of these structures is a prerequisite to maintain world-class research in Europe. The coordination in Europe is and should be firmly established through CERN.

Research Conditions - Promoting Young Scientists

The research conditions must guarantee the maintenance and further evolution of expertise during the long project lifetimes and be attractive for junior scientists.

An outstanding European research landscape in particle physics is the basis to ensure scientific progress and the attractiveness of the field. In order to guarantee the continuity and evolution of indispensable expertise in computing, software, detectors and accelerators, the personnel structures must be adapted to the long-term duration of projects. Young scientists are often the source of new ideas and have the cutting-edge competence in many areas. Their scientific and technical contributions should be given high visibility and they need promotion and predictable career prospects.

Outreach

The commitment of scientists to activities that create public awareness and support is crucial and must be recognized as beneficial to their career record. Inspiring the next generation through outreach activities is an indispensable task.

Outreach and science communication aim at communicating current research questions and results, thereby raising public awareness of the societal benefits of particle physics and enhancing the support by the general public. Outreach programs also create opportunities for young people to encounter role models and to obtain insight in the research process. Access to open data online or in masterclass programs enable participation of the public in scientific research. Scientists have the opportunities to share their enthusiasm in outreach and communication efforts worldwide.

Querschnittsthema: Software und Computing

- Diskussion über die zukünftigen Computingkonzepte
  - Strukturen und Softwareumgebung (getrieben von Anforderungen am HL-LHC)
  - Implikationen auch für die Hardware und vor allem das Netzwerk
- Diskussionen auf allen Ebenen
  - BMBF: Trialog ErUM-Data
  - BMBF-Workshop zum Computing am 4./5.10.2018
  - KET (Computing- und Software Panel)
  - WLCG/CERN
- Papiere
  - Ausführliches Papier vom KET Computing- und Software Panel
  - Papier der Mitglieder des Trialogs ErUM-Data (noch nicht öffentlich)
  - Abschlussdokument des BMBF-Workshops (noch nicht öffentlich)
- Community übergreifender Antrag
  - Weiterentwicklung der Computing Technologien (z.B. Virtualisierung mit Containern von Diensten) und Anwendung im Umfeld heterogener Ressourcen
  - Weiterentwicklung von Deep Learning Methoden und Methoden zur Ereignisrekonstruktion

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  - Weiterentwicklung

Sprecher

Markus Schumacher

Günter Quast (Stellvertreter)

Mitglieder

KET

M. Schumacher

M. Elsing

FSPs

ALICE: Thorsten Kollegger

ATLAS: A. Quadt

CMS: G. Quast

LHCb: J. Marks

Belle II: Thomas Kuhr

HGF

DESY: V. Gülzow

KIT: A. Heiss

MPG: S. Kluth

TAB Sprecher für technischen Support

K. Schwarz

T. Kress

Querschnittsthema: Software und Computing

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Gemeinsamer Antrag von Gruppen aus den Bereichen Elementarteilchenphysik, Hadronen- und Kernphysik und Astroteilchenphysik

- Rheinisch-Westfälische Technische Hochschule Aachen, Prof. Dr. Martin Erdmann
- Rheinische Friedrich-Wilhelms-Universität Bonn, PD Dr. Philip Bechtle
- Friedrich-Alexander-Universität Erlangen-Nürnberg, Prof. Dr. Gisela Anton
- Goethe Universität Frankfurt am Main, Prof. Dr. Volker Lindenstruth
- Albert-Ludwigs-Universität Freiburg, Prof. Dr. Markus Schumacher
- Georg-August-Universität Göttingen, Prof. Dr. Arnulf Quadt
- Universität Hamburg, Jun.-Prof. Dr. Gregor Kasieczka
- Karlsruher Institut für Technologie, Prof. Dr. Günter Quast
- Johannes Gutenberg-Universität Mainz, Prof. Dr. Volker Büscher
- Ludwig-Maximilians-Universität München, Prof. Dr. Thomas Kuhr
- Bergische Universität Wuppertal, Prof. Dr. Christian Zeitnitz

Assoziierte Partner sind

- CERN, Dr. Markus Elsing
- DESY, Dr. Volker Gülzow
- GridKa, Dr. Andreas Heiss
- GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Dr. Kilian Schwarz
- Forschungszentrum Jülich, Dr. Elisabetta Prencipe
- Westfälische Wilhelms-Universität Münster, PD Dr. Christian Klein-Bösing

Querschnittsthema: Software und Computing

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einsamer Antrag von Gruppen aus den Bereichen
Elementa… …hysik, Hadronen- und Kernphysik und Astroteilchenphysik

- Rheinisch- …e Technische Hochschule Aachen, Prof. Dr. Martin Erdmann
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- Georg-August-Universität Göt… …Dr. Arnulf Quadt
- Universität Hamburg, Jun.-Prof. D… …asieczka
- Karlsruher Institut für Technologie, Pr… …er Quast
- Johannes Gutenberg-Universität Mainz, H… …ker Büscher
- Ludwig-Maximilians-Universität München, Pro… …as Kuhr
- Bergische Universität Wuppertal, Prof. Dr. Christi…

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- Forschungszentrum Jülich, Dr. Elisabetta Prencipe
- Westfälische Wilhelms-Universität Münster, PD Dr. Christian Klein-Bösing

Querschnittsthema: Software und Computing (2)

- Presseerklärungen der GWK zur Nationalen Forschungsdaten Infrastruktur (NFDI)
  - Ausschreibungen ab 2019 von ca. 90M€/Jahr
  - Förderung von Konsortien und NICHT einzelnen Communities!
- Zur Zeit läuft eine Initiative um die KAT, KET und KHuK Community zusammen für mögliche Anträge aufzustellen
  - Vorstellung eines Teilchenphysik-Konsortiums
- Wichtig ist es unsere Helmholtz-Zentren als Serviceprovider zu positionieren
  - KIT, DESY, GSI/FAIR
- ABER: NFDI wird unser Ressourcenproblem für LHC-Run 3 und erst recht Run 4 nicht lösen!

Mehr Infos

- KET-Webseite
- Vorträge bei der KET-Jahresversammlung 2018