

This report is a copy of the CHIPP Annual report 2012 that had to be delivered to SCNAT.
Therefore, it is structured along the SCNAT guidelines and format.

SUMMARY

Highlights of the Year

CHIPP enjoyed several highlights in 2012:

- The **SCNAT Membership** of CHIPP took effect in 2012 and strengthens its visibility and impact.
- The **Plenary meeting** at Kartause Ittingen (13/14 September 2012) was attended by more than 80 CHIPP Members and saw 20 talks each followed by a discussion session. In addition, reports from 5 international committees as well as from the CHIPP Outreach and the CHIPP Computing Board were presented. Finally, the prize for the best PhD thesis in experimental and theoretical particle physics was awarded (see below).
- The wealth of results produced in the C15 project “Swiss Centre for Advanced Studies in Particle Physics in the LHC era” was astonishing: This 5 year SUK project funded jointly by the State Secretariat for Education and Research SER (now: SERI) and the ETH-Rat brought together 5 institutes from cantonal and federal universities. With the help of 9 PostDocs, selected in international competition from more than 100 candidates, a high international visibility of the Swiss particle physics groups was achieved, contributing significantly to the more than 300 publications for the years 2011 and 2012, and benefitted to the whole Swiss university landscape. More information can be found at <http://www.chipp.ch/chipp-doctoral-programme.html>.
- The impressive press coverage surrounding the **Higgs boson** including the associated CHIPP Outreach activities and the results from the SER funded project ‘Verflixtes Higgs’ (details see <http://www.teilchenphysik.ch/> [for the time being available only in German]).

SECTORS OF COMPETENCE: NETWORKING AND DEVELOPMENT OF SCIENCE

Publications

The C15 project “Swiss Centre for Advanced Studies in Particle Physics in the LHC era” led to a Mid-Term Report, in which the resulting transversal collaboration and the intimate link between PhD and PostDoc level was nicely illustrated through 12 talks involving all five partner institutes. Copies can be downloaded at http://www.chipp.ch/documents/CHIPP_Mid-termreportSUKC15_5.6.12.pdf.

In September, CHIPP submitted a report to the Rectors’ Conference of the Swiss Universities CRUS called “Cost-intensive Infrastructures: Particle and Astroparticle Physics”. CRUS had asked for this report as part of the Conference’s preparatory work in view of the forthcoming new university legislation [HFKG]. In its Article 3h, the HFKG requires that CRUS coordinates the particularly cost-intensive

research fields throughout Switzerland with the goal of avoiding double investments, purchases and projects. In order to be able to propose useful coordinative measures once the legislation comes into force, CRUS has decided to select four disciplines as test-beds, among them particle and astroparticle physics. The report is available at http://www.chipp.ch/documents/Costly_IS_final_as_approved_20120912.pdf.

Meetings, Workshops and Schools

In addition to the Plenary, which is to be considered as the Swiss national conference on Particle Physics (see Zusammenfassung / Highlights), CHIPP continued to work on its educational goals and organised or co-organized also in 2012 several Schools and Workshops:

- From 9-12 January 2012, the University of Zurich saw the Zurich Phenomenology Workshop (<http://www.phys.ethz.ch/~pheno/HiggsWorkshop2012/index.html>), bringing together leading researchers from experimental and theoretical elementary particle physics to discuss the results of the 2010-12 LHC runs at CERN and their implications for unravelling the structure of particle physics at the Fermi scale. Organised jointly by Prof. C. Anastasiou (ETHZ) and Prof. Th. Gehrman (University of Zurich), the meeting featured 25 talks from national and international scientists.
- The fourth CHIPP PhD Winter School (<http://chiochia.web.cern.ch/chiochia/CHIPP2012/>) was dedicated to the experimental and theoretical aspects of LHC physics and assembled 27 students from all three large LHC collaborations with Swiss participation in Engelberg between 22 and 27 January 2012. Jointly organized by Prof. V. Chiochia (University of Zurich) and Dr. G. Pásztor (University of Geneva) the school's programme was built around five lectures on LHC phenomenology, LHC experimental results, flavour physics, and statistical methods for HEP analysis. Dedicated discussion sessions took place in the evening, where lively and constructive debates took place in small groups, self-organized typically around the international lecturers. Members of different LHC collaborations shared their experience and knowledge with each other, and started dialogues on their subjects.
- From 15 - 20 July 2012, the CSF in Ascona hosted the international workshop "DarkAttack2012" (<http://www.itp.uzh.ch/events/darkattack/index.html>), organised by Prof. L. Baudis (University of Zurich). The Workshop brought together scientists looking for Dark Matter in particle physics, astrophysics and cosmology, and aimed at facilitating their collaboration and promoting the exchange of new ideas across the different communities. This stimulating meeting assembled 19 invited international speakers and some 40 other participants and promoted the development of a new, truly global approach to the discovery and characterization of Dark Matter. It provided a great opportunity for scientists to join forces in tackling one of the biggest unsolved mysteries of fundamental physics.
- The SPS annual meeting (21-22 July) took place at the ETH Zurich and was also a meeting place for many Swiss particle physicists. The TASK session (Teilchen-, Astro-, Kernphysik) was organized by Prof. M. Pohl (University Geneva) and saw more than 50 contributions mostly by PhD students from the CHIPP community.
- The Zuoz Summer School <http://tpth.web.psi.ch/zuoz2012/> took place between 19 and 25 August under the title "Closing in on the Standard Model". Seven speakers (national and international) gave 15 lectures and an interesting seminar. The School was organised by Dr. M. Spira (Theory Group of the Laboratory for Particle Physics at PSI).
- As it is tradition in August, the University of Zurich and the ETHZ organised the PhD seminar mandatory for all particle physics PhD students in the Zurich area.

INTERNATIONAL ACTIVITIES

Scientific cooperation

Particle and astroparticle physics has been the first field of research, which has used extensively transnational and international cooperation. This need was triggered by the fact that research projects in this domain were (and still are) often large undertakings, representing an important intellectual and technological challenge and requiring a large amount of human and financial resources. Therefore, it goes without saying that they cannot be carried out locally at the level of an individual university by individual groups but require national, regional or global collaboration. For instance, the detector collaborations at CERN involve between 60 and 180 institutes and laboratories per experiment! Also at national level, the success of Swiss particle and astroparticle physics is based on small, large and extremely large collaborations, mostly across the Swiss border. Many of them occur naturally – between groups working in the same field or requiring the same type of infrastructure – or are coordinated bottom-up by CHIPP. Such collaborations may be carried out at an informal level and are sometimes not even noted at the level of the home institution. In addition, experiments in particle and astroparticle physics usually involve research facilities, which again are the result of national, regional and global collaboration. For this reason, it is not possible in this report to list all the people and groups engaged in scientific collaborations.

Institutional collaboration:

Several CHIPP Board members are acting as official delegates to international organisations:

- Prof. Ulrich Straumann (University of Zurich) is mandated since 2007 by SER as Swiss scientific delegate to the CERN Council; his mandate ended on 31 December 2012. In addition, he is representing the Swiss participants in Resources Board of the CTA project (Cherenkov Telescope Array).
- Prof. Maurice Bourquin's mandate (University of Geneva) as Swiss scientific delegate to the ApPEC General Assembly (Astroparticle Physics European Consortium) ended on 31 December 2012; Prof. Teresa Montaruli (University of Geneva), who will succeed him officially as from 2013 onwards, already attended the November 2012 General Assembly.
- Prof. Bernd Krusche (University of Basel) has been reappointed in May 2012 by the Swiss National Science Foundation (SNSF) as Swiss representative in NuPECC (Nuclear Physics European Collaboration Committee).
- PD Dr. Michele Weber (University of Berne) is serving since January 2009 as CHIPP representative in the Advisory Committee of CERN Users (ACCU).
- Prof. Thomas Gehrmann (University of Zurich) is mandated by the CHIPP Plenary since January 2010 to represent the Swiss particle physics community in the Restricted ECFA (European Committee for Future Accelerators); his mandate ended on 31 December 2012. In the Plenary ECFA, Prof. Xin Wu (University of Geneva) terminated his appointment after five years also on 31 December 2012, whereas PD Dr. Michele Weber (University of Berne) and Dr. Terence Garvey (PSI) continue to represent Switzerland beyond 2012.
- Prof. Klaus Kirch (PSI and ETHZ) is the Swiss representative in the European Strategy Group, working on the update of the 2006 European Strategy in Particle Physics.

COORDINATIVE TASKS

Promotion of the next generation

Also in 2012, CHIPP Members and CHIPP institutes continued their efforts of attracting young women and men to particle and astroparticle physics. At several institutes, educational events like information

days for future students and for Matura/Kantonsschulklassen, talks targeted to Gymnasium students, children's university, education day and talks on elementary particles for physics teachers were organised and single pieces of equipment were exhibited at Gymnasiums. One should mention specifically the participation of the Universities of Berne, Geneva, Zurich and the ETHZ in the European Masterclasses "Hands on Particle Physics", where over 8000 Gymnasium level students from more than 160 institutes from 33 countries can actually work with real data from the CERN LHC.

Visits to CERN and to the experiments control rooms as well as to PSI and its particle physics and accelerator facilities were organized for university students in physics.

The project „Verflixtes Higgs“, funded by SER, aims at visualising in a comprehensible way the newest results from particle physics (like Higgs) to Swiss Mittelschülerinnen and Mittelschüler. In the centre of the project one can find a new dedicated internet page www.teilchenphysik.ch (for the time being available only in German), where explanatory text, figures and videos dealing in one way or the other with particle physics, the Higgs mechanism and the standard model.

Also in 2012, CHIPP has awarded a prize for the best PhD thesis in experimental and theoretical particle physics. The 2012 award went to Franz Herzog from ETHZ for his work on QCD corrections and non-linear mappings. The *laudatio* says: "For his contributions in developing a new method for NNLO perturbative calculations and its application to the phenomenology of the Higgs boson". The prize winner was selected from eight candidates and was presented with the prize money (3000 CHF) and the CHIPP diploma during the CHIPP Plenary at Kartause Ittingen (for details see at <http://www.chipp.ch/chipp-prize.html>).

Information and coordination tasks supporting research and science

CHIPP's administrative work is facilitated by an Administrator, supporting the Chair and the Association in organisational matters. In this context, CHIPP has at its disposal an internet page <http://www.chipp.ch> which contains news, documents, information about meetings, and the complete membership data base. According to the goals as set out in the Statutes and By-Laws CHIPP initiates and promotes a continuous dialogue between the institutes, aiming at having at hand in a timely and transparent manner the information about ongoing and planned research activities in the groups including funding and manpower needs (<http://www.chipp.ch/documents/StatutesBylaws.pdf>). This information was collected also in 2012 and condensed as usual in a coherent Long-Term Financial Planning table of particle and astroparticle physics projects, made available for planning purposes to the SER and the SNSF.

CHIPP took actively part in the SCNAT's Round Table International, an information forum on participation of Swiss groups in international research facilities, comprising representatives of the SER, SNSF, and CRUS.

Dialogue with society

Several members of CHIPP gave public lectures and participated at public conferences, e.g. at a conference at the "Société Vaudoise des Sciences Naturelles", or at the "Fondation Suisse d'Etudes / Schweizerische Studienstiftung" with a presentation about LHC physics and high-energy research in general, followed by a round-table discussion involving the participating students from all fields of higher education, including social sciences. In addition, Prof. Antonio Ereditato (University of Berne) and Prof. Teresa Montaruli (University of Geneva) participated actively at the Congress of SCNAT (Forschung am geographischen Limit).