



We're already almost halfway, with the last parallel sessions this morning. In the afternoon, an open plenary ECFA-EPS session is complemented with exciting outreach and art@CMS events.

Outreach

A classic at EPS-HEP conferences are the outreach activities for the general public – maybe interesting for you too! The local organizers prepared a very attractive 'Cool Physics' program starting at 13:30 today at Campus Ledeganck. Highlights are the continuous **Physics Exhibition** with posters on particle physics and its instruments as well as famous Belgian physicists, animations, and hands-on setups; **Physics on Stage** with a spectacular series of demonstrations on stage using mainly everyday tools and materials; and **virtual visits** to the stunning CMS and VIRGO experiments.



Science & Art

In the *Zwarte Zaal* at KASK, we present the **science & art exhibition 'ORIGIN poetics 2019'**. A result of academic dialogue with artists from different European art universities. The official vernissage is scheduled on Saturday from 19h–20h, featuring symposium presentations together with KASK artists. Further openings of the exhibition: Sat 13–19h, Mon and Tue 13–17h.



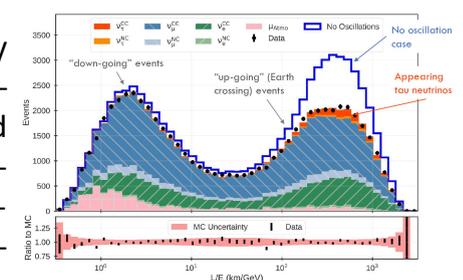
Highlights of Friday

In the joint **astroparticle-cosmology** session, AMS-02 results were strongly debated. Also novel astrophysical ways of probing neutrino properties and the $C\nu B$ were discussed. The afternoon **cosmology** session zoomed in on the cosmological constant problem. New results from the DES, challenging the so-called σ_8 and H_0 tension, sparked animated exchanges.

The **detector R&D and data handling** session explored machine learning to fully exploit detector possibilities. Coping with data-deluge by bringing more intelligence further upstream is done eg. with FPGA electronics. To reduce the amount and size of events, many experiments exercise flexible ways of data-reduction to reach specific goals.

Turning to **heavy ion physics**, we saw a large set of new measurements on quarkonia and heavy-flavour production, in particular puzzling ALICE results on the J/ψ elliptic flow in pPb and the triangle flow signal in PbPb. There were new ATLAS results on precision EWK boson production, and a focus on gluon nuclear PDFs.

Time for accelerator **neutrinos**. Interesting results on the mass hierarchy came from NOvA. T2K keeps improving the CP violation results, already rejecting the non-CPV option by more than 2σ , while the next generation experiments DUNE and HK reported their future 5σ sensitivity on CP violation and other measurements. Complementing the 6.1σ observation of ν_τ appearance by OPERA, IceCube reported on ν_τ appearance from atmospheric neutrinos.



Concerning **QCD and hadronic physics**, numerous α_s extractions from various collider data with (N)NNLO perturbative accuracy were presented. Another highlight is the continuous effort on improving the $g-2$ predictions, by enhancing the precision of both the input data and theoretical methodologies.

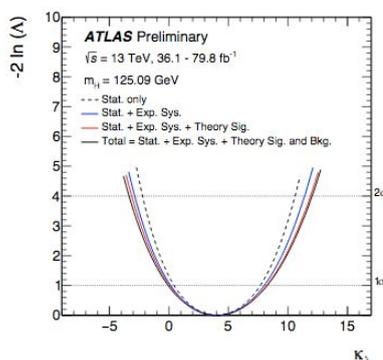
In the realm of **top and EWK physics**, as a highlight among precision measurements was a new formalism to include mixed QCD-QED effects in q_T -resummation, leading to a significantly improved theoretical precision for Z production. Otherwise noteworthy were the CMS results closing in on 4-top production.

The lively **outreach, education and diversity** session saw a wide variety of topics, from outreach in the context of the EPPS update, over data challenges reaching out to different communities, to training programmes in regions with scarce science opportunities. Diversity actions were also discussed. A hot topic was the relation between art and science. Clearly Art&Science is here to stay!

Turning to **flavour physics and CP violation**, new lepton universality ratio (R_K) and isospin asymmetry results were presented by Belle. Also the recent re-emergence was discussed of the tension between inclusive and exclusive determinations of V_{cb} . Such a tension also persists in V_{ub} . Impressive sensitivities in muon CLFV channels are foreseen for the near future.

“The data matches the predictions from the SM” was the motto of the **searches for New Physics** session. Several results appear now with full LHC Run2 dataset. New CMS analyses target delayed objects from a hypothetical long-lived mediator. Complementary analysis are in full swing and no stone is left unturned.

Theoretical and experimental **BSM Higgs physics** results were reported, while expectations for future facilities and combination results generated discussion. Precision results



from CMS $H \rightarrow ZZ$ and ATLAS $H \rightarrow \gamma\gamma$ were shown, and ATLAS extracted the Higgs trilinear coupling (figure) from single-Higgs production.

In this first session of **accelerators for HEP**, we saw developments and plans for the HL-LHC and beyond from different perspectives. Future 20y plans for the whole CERN’s accelerator complex were discussed, as well as the Gamma factory proposal with potential ambitious applications. The new facility NICA at JINR was presented as well as a proposed conversion of DAFNE at Frascati into a test facility.

Today’s sessions

The programme of today’s sessions links as before the detailed Indico agendas through the session titles.

Accelerators for HEP

New acceleration techniques and beam optimization for existing or future colliders are the protagonists here: SuperKEKB, AWAKE, FCC-ee, CLIC, muon colliders, etc.

Astroparticle Physics and GW

The journey through our universe continues with neutrinos, cosmic rays, black holes, and a particular focus on gravitational waves!

Flavour Physics and CP Violation

Lots of results and phenomenological discussions of rare B decays and anomalies, their implications on new physics, and new measurements in the flavour-physics field.

QCD and hadronic physics

Heavy-flavour production, hadron spectroscopy, exotic tetraquarks, and many other interesting experimental results and phenomenological studies.

Top and Electroweak physics

Today’s session is focused on multi-boson production and vector-boson scattering, and on prospects for electroweak studies at the HL-LHC and future colliders.

Neutrino Physics

This session kicks off with the search for sterile neutrinos at different facilities. The status of current and future experiments is also discussed, complemented by phenomenology discussions.

Heavy Ion Physics

The session starts with interesting results from ultra-peripheral heavy-ion collisions and photon scattering, and continues with more measurements from nuclear collisions: multiplicity, correlations, anisotropies, etc.

ECFA-EPS Special session

The afternoon features an open plenary session from the European Committee on Future Accelerators, giving a window to the future in the context of the ongoing update of the European Strategy on Particle Physics. Collider, detector and computing challenges are highlighted, and a view is given on Higgs physics at future accelerators and physics beyond colliders, also connecting to the fields of astroparticle and nuclear physics.

Did you know?

The skyline of Ghent is famously dominated by the spires of its three medieval towers. But there is a fourth and equally impressive tower: it is called **Boekentoren**, or Tower of Wisdom, and is part of the Ghent University Library. It was designed by the Belgian architect **Henry van de Velde**. Fun fact: he also designed the logo of the National Railway Company of Belgium.



In 1942 the Boekentoren was reaching a height of 64 metres, accommodating over 3 million books — that's 46 kilometres worth of knowledge! On top, the belvedere offers spectacular views of Ghent, lining up perfectly with the three towers in the city centre. Legend has it that the occupants of the building know the location of a secret pool table in the belvedere, where they can play with an astonishing view!

Picture of the day

Thursday's beer tasting crew after a job well done ...



... and yesterday's lovely setting for the concert.

