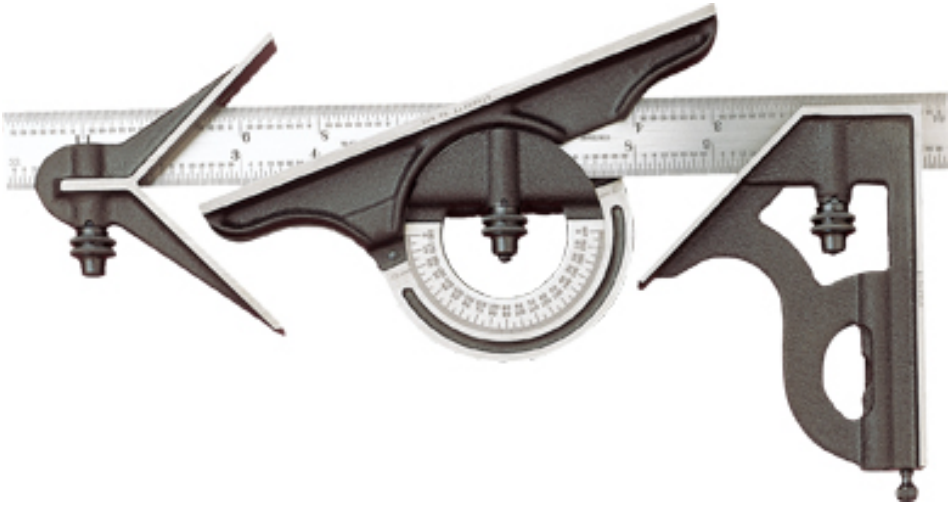
What Next: pagina del gruppo di lavoro ”Standard Model”



Report dei Contributi

https://agenda.infn.it/e/7638

ID contributo: **1** Tipo: **non specificato**

Testing special relativity through decay of high energy particle

An important test of the special relativity theory consists in verifying two key predictions: the relative widths of unstable particles are independent from their Lorentz boost and their laboratory lifetimes is proportional to the boost parameter
γ. These predictions can be subject to experimental tests measuring lifetimes and branching rations of unstable particle in flight at variable γ.
This field is relatively uneexplored: only in few cases precision measurements of particle lifetimes at different γ have been performed. After a brief introduction to the theoretical framework we present some suggestions for possible future experiments.

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ID contributo: **2** Tipo: **non specificato**

Projections for Top FCNC Searches in 3000 fb−1 at the LHC

Searches for t ⟶ Zq in top-quark pair events with a topology compatible with the decay chain tt ⟶ Zq + Wb ⟶ llq + l′ νb (l = e, μ) are presented. Projections on ex- clusion limits with luminosities of 300 fb−1 and 3000 fb−1 of proton-proton collisions at a center-of-mass energy of 14 TeV are considered.

Autore principale: CMS, Collaboration (CERN)

Relatore: CMS, Collaboration (CERN)

ID contributo: **3** Tipo: **non specificato**

Projected improvement of the accuracy of top-quark mass measurements at the upgraded LHC

Estimates of the ultimate precision of measurements of the top-quark mass achievable with 300–3000 fb−1 of proton-proton collisions at a center-of-mass energy of 14 TeV are presented. Possible improvements in the understanding of systematic uncertain- ties are discussed for various top-quark mass measurement techniques. Building on new insights from recent studies at the LHC, the extrapolations to high luminosity promise an ultimate precision that is significantly better than previous estimates.

Autore principale: CMS, Collaboration (CERN)

Relatore: CMS, Collaboration (CERN)

ID contributo: **4** Tipo: **non specificato**

Precise measurement of hadronic cross section at low energy for alpha_em(M_Z0) and (g-2)_mu

For the precision test of the Standard Model at future e+e- colliders (like TLEP or ILC), as well as for the reduction of the theoretical error of the Muon (g-2), an improvement on the knowledge of the low energy non perturbative effects is mandatory. These effects to alpha_em(M_Z0) and to (g-2)_mu can be obtained by precise measurements of the hadronic cross sections at low e+e- machine (i.e. around few GeV), like Dafne and other flavour factories.

Summary

Si sottolinea l'importanza di supportare le facilities e+e- a bassa energia esistenti (come per esempio Dafne) o nuove (nuove flavour factories), per la misura di precisione della sezione d'urto e+e- in adroni per la riduzione dell'incertezza sul contributo adronico al running di alpha_em e al (g-2) del muone. Tale incertezza, se non opportunamente ridotta puo' diventare un fattore limitante per il fit EW del Modello Standard ai futuri collisori e+e- tipo TLEP o ILC, o per la misura del g-2 del muone.
Ref:

http://arxiv.org/abs/hep-ph/0608329
http://arxiv.org/abs/arXiv:1007.5219
http://arxiv.org/abs/arXiv:1308.6176
http://arxiv.org/abs/arXiv:1307.7967

Autore principale: Dr. VENANZONI, Graziano (LNF)

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ID contributo: **5** Tipo: **non specificato**

New Physics signals from measurable polarization asymmetries at LHC

We propose a new type of Z polarization asymmetry in bottom-Z production at LHC that should be realistically measurable and would provide the determination of the so-called Ab parameter, whose available measured value still appears to be in disagreement with the Standard Model prediction. This polarization can be measured independently of a possible existence of Supersymmetry. If Supersymmetry is found, a second polarization, i.e. the top longitudinal polarization in top-charged Higgs production, would neatly identify the tanβ parameter. In this case, the value of Ab should be in agreement with the Standard Model. If Supersymmetry does not exist, a residual disagreement of Ab from the Standard Model prediction would be a clean signal of New Physics of "non Supersymmetric" origin.

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Relatore: PANIZZO, Giancarlo (U)

ID contributo: **6** Tipo: **non specificato**

HE-LHC

I believe that the scenario for "What Next" in the SM group (and not only) should include the possibility to push for HE-LHC as an alternative to other paths.

Summary

The HE-LHC option, with a CM energy of O(30) TeV should be explored as an inttermediate way of exploring the SM parameters as well as (of course) pushing the reach for new physics.
The original plan that the 14 TeV should be followed by a HL phase, should be discussed against the possibility of running at Higher Energy.
What Next should include this scenario. The LHC at 14 TeV running will explore many parameters in the Higgs sector.
At this point in time we do not have any "no loose" theorem. The SM is now complete and, in order to move forward, we need access to more energy.
I include one presentation by M. Mangano who describes the physics case for a LHE (and a VHE) LHC. While a 100 TeV collider is certainly a beautiful idea, but far in time, a running with stronger magnet at 28 TeV can be better than running for 3000 fb-1.
I also include (besides Michelangelo's talk) the Higgs cross section as a function of cm

Autore principale: CHIARELLI, Giorgio (PI)

Relatore: CHIARELLI, Giorgio (PI)

ID contributo: **7** Tipo: **non specificato**

Vector Boson Scattering and Quartic Gauge Coupling Studies in WZ Production at 14 TeV

Studies of the pp -> WZjj vector boson scattering process in 14 TeV pp collisions using upgraded CMS detector configurations are presented. These studies include assessments of the discovery potential for observing longitudinal vector boson scattering for luminosities up to 300/fb and for observing anomalous quartic gauge couplings with luminosities of 300/fb and 3000/fb.

Summary

This paper summarizes the results about the physics potential of the CMS detector at LHC for the measurement of the vector boson scattering process in the WZjj channel. Two luminosities scenarios are considered, one for 300/fb, corresponding to the expectations at the end of Run3, and one for 3000/fb, the ideal goal of HL-LHC. Both scenarios correspond to different stages of upgrade of the current detector.

Autore principale: COSSUTTI, Fabio (TS on behalf of the CMS Collaboration)

Relatore: COSSUTTI, Fabio (TS on behalf of the CMS Collaboration)

ID contributo: **8** Tipo: **non specificato**

Projected Performance of an Upgraded CMS Detector at the LHC and HL-LHC: Contribution to the Snowmass Process

The physics reach of the CMS detector achievable with 300(0)/fb of proton-proton collisions recorded at sqrt(s) = 14TeV is presented. Ultimate precision on measurements of Higgs boson properties, top quark physics, and electroweak processes are discussed, as well as the discovery potential for new particles beyond the standard model. In addition, the potential for future heavy ion physics is presented. This document has been submitted as a white paper to the Snowmass process, an exercise initiated by the American Physical Society's Division of Particles and Fields to assess the long-term physics aspirations of the US high energy physics community.

Summary

This paper summarizes the results about the physics potential of the CMS detector at LHC with the luminosity increase expected in the forthcoming runs. Two luminosities scenarios are considered, one for 300/fb, corresponding to the expectations at the end of Run3, and one for 3000/fb, the ideal goal of HL-LHC. Both scenarios correspond to different stages of upgrade of the current detector.

Autore principale: COSSUTTI, Fabio (TS on behalf of the CMS Collaboration)

Relatore: COSSUTTI, Fabio (TS on behalf of the CMS Collaboration)

ID contributo: **9** Tipo: **non specificato**

Projections for measurements of Higgs boson cross sections, branching ratios and coupling parameters with the ATLAS detector at a HL-LHC

Studies are presented on the prospects for measuring Higgs boson production cross sec- tions times branching ratios, and determining couplings to individual fermions and bosons in 14 TeV proton-proton collisions at the LHC with 300 fb−1 and at the HL-LHC with 3000 fb−1. Several studies already presented at the 2012 European Strategy meeting are updated. In addition first analyses are presented of H → Zγ, of ZH production with H → invisible final states, and on the measurement of the Higgs width from the interference in H → γγ.

Autore principale: ATLAS, Collaboration (_)

Relatore: ATLAS, Collaboration (_)

ID contributo: **10** Tipo: **non specificato**

Prospects for measurements of the HZZ vertex tensor structure in H ⟶ ZZ* ⟶ 4l decay channel with ATLAS

In this note, the prospects for experimental studies of the general HVV tensor coupling using the H ⟶ ZZ* ⟶ 4l decay are presented. The sensitivity of the ATLAS experi- ment to non-Standard Model contributions to the HZZ vertex is estimated for 300 fb−1 and 3000 fb−1 of LHC data at √s = 14 TeV. The exclusion limits on the non-Standard Model CP-even coupling g2 and CP-odd coupling g4, given the Standard Model Higgs boson sig- nal, are estimated. The sensitivity of the ATLAS experiment to the complex structure of the non-Standard Model couplings is demonstrated. The exclusion limits are established for individual components of g2 and g4: |g2|/g1, |g4|/g1, R(g2)/g1, I(g2)/g1, R(g4)/g1 and I(g4)/g1 . The obtained results are translated to the (fg2 , fg4 , φg2 , φg4) parametrisation as
fg2 < 0.29 (0.12) at 95% CL and fg4 < 0.15 (0.037) at 95% CL for 300 fb−1 (3000 fb−1) respectively.

Autore principale: ATLAS, Collaboration (_)

Relatore: ATLAS, Collaboration (_)

ID contributo: **11** Tipo: **test**

A two parameters fit of lepton and quark masses

In the three charged fermion families of the Standard Model, the mass ratios between 2^{nd} and 1^{st}, 3^{rd} and 2^{nd} generations can be approximated by power laws of the integer numbers 3, 4 and 7 with integer exponents which are function of their generation index i=1, 2, 3. Each recursive formula is extended to i=0 and this mass value is used as a free parameter to fit the lepton and quarks experimental masses. All together the lepton and quarks masses are reproduced within few percent by only one free parameter which turns out to be $R_C = Q_e/Q_m$, the ratio of electric and magnetic charge.
The compatibility of the model with the SM of elementary particles and a possible interpretation of the nature of hadron masses as due to hidden magnetic charges is discussed. In the same framework of power law mass ratios a peculiar type of the neutrino mass spectrum, compatible with the measured square mass differences of oscillating neutrinos, has been found. In conclusion the SM fermion masses have been fitted by two free parameters.

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Relatore: Prof. PALMONARI, Federico (INFN & University, Bologna)

ID contributo: **12** Tipo: **test**

Verifica del Mofello Standard tramite la misura della Asimmetria Violante la Parità (APV

Una classe di esperimenti che hanno la potenzialità di effettuare verifiche molte precise del Modello Standard. Si tratta degli esperimenti che misurano la Asimmetria Violante la Parità (APV) nella diffusione di elettroni su nuclei e nucleoni. L'elettrone interagisce con la materia tramite interazione elettrodebole. La parte elettromagnetica di questa interazione è, come ben noto, preponderante rispetto alla parte debole. Ne risulta che, se nessun "accorgimento sperimentale"è adottato, quello che uno misura nella diffusione di elettroni su nuclei e nucleoni è un'ampiezza di diffusione proporzionale, di fatto, alla sola ampiezza elettromagnetica. Un metodo per estrarre informazioni sulla parte debole dell'interazione elettrodebole è quello di condurre due esperimenti di cui il secondo è la replica speculare del primo. Un esempio è proprio dato dalla diffusione di elettroni relativistici di elicità opposta su nuclei e nucleoni. Se l'interazione elettrodebole conservasse la parità, non ci sarebbe nessuna differenza nelle sezioni d'urto di elettroni con elicità opposta. Poiché, viceversa, la parte debole dell'interazione elettrodebole non conserva la parità la cosiddetta "Asimmetria Violante la Parità, definita come
APV=(σ_R- σ_L)/(σ_R+ σ_L)
con σ_R(σ_L) la sezione d'urto per elettroni destrorsi (sinistrorsi), non è nulla ed è proporzionale alla parte debole dell'interazione elettrodebole, o meglio, al termine di interferenza tra termine debole e termine elettromagnetico (la parte elettromagnetica conserva la parità e dà quindi un contributo nullo ad APV). La diffusione di elettroni su nuclei e nucleoni diventa quindi un mezzo molto potente, allorché si misura l'Asimmetria Violante al Parità, per misurare tutta una serie di grandezze legate alla parte debole dell'interazione elettrodebole, mettendo a disposizione dello sperimentatore fasci di intensità molto elevata.
Il Modello Standard dà tutta una serie di previsioni sui valori di molte grandezze. Una misura di queste grandezze comporterebbe quindi automaticamente una verifica del Modello Standard e se una differenza risultasse tra valore misurato e valore predetto, automaticamente vi sarebbero indicazioni dell'esistenza di una "Fisica oltre il Modello Standard". Molte di queste grandezze sono legate alla parte debole dell'interazione elettrodebole. Esempi sono gli accoppiamenti deboli effettivi tra elettrone e quark (C1q e C2q), la carica debole dell'elettrone, la carica debole del protone, il valore di sin2ϑW (ϑW angolo di mixing) e il suo running ecc. Recentemente, nei laboratori JLAB, in Virginia, è stata effettuata per la prima volta con precisione, dall'esperimento PVDIS, utilizzando elettroni di 6 GeV di energia, la misura del valore 2C2u −C2d (dove gli indici "u"e "d"indicano il quark up e il quark down rispettivamente), dimostrando che il valore di questa grandezza non è nullo ed è, entro gli errori di misura, compatibile con il valore predetto dal modello standard. I risultati sono stati pubblicati su Nature (Nature 506, 67–70 FEB 6 2014) e sulla pagina delle news del sito web INFN. Un nuovo run dell'esperimento che utilizzerà elettroni di 12 GeV e un assai più sofisticato apparato sperimentale verrà effettuato allorché l'energia massima del fascio di elettroni di JLAB sarà portata da 6 a 12 GeV. Sempre a JLAB, l'esperimento Qweak sta misurando con una certa precisione la carica debole del protone e l'esperimento MOLLER misurerà, tramite la misura della Asimmetria Violante la Parità nella diffusione elettrone-elettrone, la carica debole dell'elettrone e il valore di sin2ϑW con grande precisione (0.1%, vedi ad es. http://hallaweb.jlab.org/collab/PAC/PAC37/C12-09-005-Moller.pdf, proposta dell'esperimento sottomessa al PAC di JLAB).

Caratteristica degli esperimenti che misurano l'Asimmetria Violante la Parità è il piccolo valore dell'Asimmetria stessa, che varia da 10-4 per esprimenti tipo PVDIS a 10-7 per esperimenti tipo MOLLER. Questo tipo di esperimenti necessita quindi l'uso di acceleratori in cui il fascio presenta caratteristiche (intensità, posizione, energia ⋯.) il più possibile indipendenti dall'elicità del fascio per evitare errori sistematici nella misura di APV.
Resto a disposizione per qualsiasi chiarimento

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ID contributo: **13** Tipo: **test**

Prospettive per le future analisi di fisica a LHC

Breve nota sulle future analisi a LHC

Summary

Vedi nota

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Relatore: NASON, Paolo (MIB)

ID contributo: **14** Tipo: **test**

Physics at the ILC

We discuss a few major physics topics where an energy-frontier e+e− collider can contribute beyond the expected reach of the LHC. We focus on precision measurements in the Higgs-boson and top-quark sectors at the International Linear Collider (ILC), an e+e− accelerator featuring a c.o.m. energy ranging from 250 GeV up to 500 GeV, and possibly 1 TeV, at different stages, with luminosities of a few 10^34cm−2s−1.

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ID contributo: **15** Tipo: **test**

Top pair production at an e+e- collider from a composite Higgs scenario

The top quark plays a central role in many New Physics (NP) models, and in understanding the details of EWSB. In the short and mid-term future, top quark studies will be mainly driven by the LHC experiments. Exploration of top quarks will, however, be an integral part of particle physics studies at any future facility. An e+e– collider will have a rich top-quark physics program mainly in two domains: top property (very) accurate determination at the top pair production threshold, search for NP with top quarks above the threshold. Here we discuss such possibilities using a composite Higgs scenario to test the expected deviations in the top pair production for different c.o.m. energy options.

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Relatore: DE CURTIS, Stefania (FI)