Higgs and Effective Field Theory HEFT 2023

Report of Contributions

https://indico.cern.ch/e/1234517

Contribution ID: **1** Type: **not specified**

Diboson production in the SMEFT from gluon fusion

Tuesday 20 June 2023 11:30 (17 minutes)

We study the loop-level gluon-fusion diboson production in the SMEFT framework. We compute analytically the helicity amplitudes for all dimension-6 operators and identify those that generate growth with energy and hence can be better constrained. Additionally, we perform a phenomenological analysis of gluon-fusion Zh production at HL-LHC, combining it for the first time with quark-initiated Zh production. Corresponding paper to appear.

PhD Student

Primary authors: ROSSIA, Alejo Nahuel (University of Manchester); VRYONIDOU, Eleni (University of Manchester (GB)); THOMAS, Marion

Presenter: THOMAS, Marion

Session Classification: Tuesday AM2

Contribution ID: **2** Type: **not specified**

HEFT vs. SMEFT in particular UV models

Tuesday 20 June 2023 09:00 (25 minutes)

Although LHC physics can be parametrized in a general and consistent way using an effective field theory (EFT) framework, two different approaches have been advocated in the literature: the Higgs EFT (HEFT) and the Standard Model EFT (SMEFT). In this talk, I compare the two alternatives in the context of particular models. Specifically, I consider the singlet extension of the Standard Model as well as the 2 Higgs Doublet Model, and perform the matching of these models to the two EFT approaches. I highlight the role of perturbative unitarity in the organization of the EFTs.

Primary author: FONTES, Duarte

Presenter: FONTES, Duarte

Session Classification: Tuesday AM1

Contribution ID: **3** Type: **not specified**

Complete SMEFT predictions for four top quark production at hadron colliders

Tuesday 20 June 2023 16:55 (25 minutes)

We study four top quark production at hadron colliders in the Standard Model Effective Field Theory (SMEFT). We perform an analysis at the tree-level, including all possible QCD- and EW-coupling orders and relevant dimension-six operators. We find several cases where formally subleading terms give rise to significant contributions, potentially providing sensitivity to a broad class of operators. Inclusive and differential predictions are presented for the LHC and a future pp circular collider operating at 100 TeV. We estimate the sensitivity of different operators and perform a simplified chi-square fit to set limits on SMEFT Wilson coefficients. In so doing, we assess the importance of including subleading terms and differential information in constraining new physics contributions. Finally, we compute the SMEFT predictions for the double insertion of dimension-six operators and scrutinise the possible enhancements to the sensitivity induced by a specific class of higher order terms in the EFT series.

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Presenter: EL FAHAM, Hesham (The University of Manchester)

Session Classification: Tuesday PM2

Contribution ID: **4** Type: **not specified**

Statistically optimal observables for global SMEFT fits

Tuesday 20 June 2023 09:50 (17 minutes)

Theoretical interpretations of particle physics data, such as the determination of the Wilson coefficients of the Standard Model Effective Field Theory (SMEFT), often involve the inference of multiple parameters from a global dataset. Optimising such interpretations requires the identification of observables that exhibit the highest possible sensitivity to the underlying theory parameters. Based on our recently developed open source framework, ML4EFT, that combines machine learning regression and classification techniques to parameterise high-dimensional likelihood ratios, I will present the integration of unbinned multivariate observables into global SMEFT fits. As compared to traditional measurements, such observables enhance the sensitivity to the theory parameters by preventing the information loss incurred when binning in a subset of final-state kinematic variables. In particular, I will focus on optimal observables in top-quark pair and Higgs+Z production at the LHC and demonstrate their impact on the SMEFT parameter space as compared to binned measurements, and present the improved constraints associated to multivariate inputs.

PhD Student

yes

Primary authors: TER HOEVE, Jaco (Nikhef and VU Amsterdam); Dr ROJO, Juan (VU Amsterdam and Nikhef); MADIGAN, Maeve; Dr GOMEZ AMBROSIO, Raquel (Milano Bicocca); Prof. SANZ GONZALEZ, Veronica (Universities of Valencia and Sussex)

Presenter: TER HOEVE, Jaco (Nikhef and VU Amsterdam)

Session Classification: Tuesday AM1

Contribution ID: **5** Type: **not specified**

A Green's Basis for the Bosonic SMEFT to Dimension 8

Wednesday 21 June 2023 11:30 (17 minutes)

We present a basis of dimension-eight Green's functions involving Standard Model (SM) bosonic fields, consisting of 86 new operators. Instead of using algebraic identities and integration by parts, we prove the independence of these interactions in momentum space, commenting about evanescent operators as well.
In this talk, we show our method to construct a Green's Basis and our application to the dimension-8 bosonic SM effective field theory (SMEFT). Besides renormalising the SM effective field theory (SMEFT), we give some ideas of another possible application: performing matching of ultraviolet models onto the SMEFT to higher order. We have implemented our basis in matchmakereft and used it to integrate out a heavy singlet scalar and a heavy quadruplet scalar up to one loop. We provide the corresponding dimension-eight Wilson coefficients. Likewise, we show how our results can be easily used to simplify cumbersome redundant Lagrangians arising, for example, from integrating out heavy fields using the path-integral approach to matching.

PhD Student

yes

Primary author: Mr DÍAZ CARMONA, ÁLVARO

Presenter: Mr DÍAZ CARMONA, ÁLVARO

Session Classification: Wednesday AM2

Contribution ID: **6** Type: **not specified**

SMEFT RGEs at dimension eight

Monday 19 June 2023 15:00 (25 minutes)

In my presentation, I shall discuss the Renormalisation Group (RG) running of the Standard Model Effective Field Theory (SMEFT) bosonic sector at 1-loop level up to order 1/Lambda;⁴, where Lambda; is the SMEFT cut-off scale. Specifically, I will explore the contributions from dimension eight operators that are tree-level generated and Lepton Number Violating operators (LNVs) at dimension five and seven, and reflect on the anomalous dimension matrix (ADM) that results from the calculation. Throughout my presentation, I will highlight several key points, including: (a) notable deviations in certain ADM elements from the expectation based on naive dimensional analysis and the largest mixing induced across different classes, (b) the mixing of tree-level generated operators into loop-level generated operators, which differs from what is known at dimension six, and (c) the contributions from LNVs to ADM elements, with comments on non-trivial vanishing entries.

PhD Student

no

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Presenter: Dr DAS BAKSHI, SUPRATIM (Granada University)

Session Classification: Monday PM1

Contribution ID: **7** Type: **not specified**

SMEFiT: a flexible toolbox for global interpretations of particle physics data with effective field theories

Tuesday 20 June 2023 10:10 (20 minutes)

The Standard Model Effective Field Theory (SMEFT) provides a robust framework to interpret experimental measurements in the context of new physics scenarios while minimising assumptions on the nature of the underlying UV-complete theory. We present the Python open source SMEFiT framework, designed to carry out parameter inference in the SMEFT within a global analysis of particle physics data. SMEFiT is suitable for inference problems involving a large number of EFT degrees of freedom, without restrictions on their functional dependence in the fitted observables, can include UV-inspired restrictions in the parameter space, and implements arbitrary rotations between operator bases. Posterior distributions are determined from two complementary approaches, Nested Sampling and Monte Carlo optimisation. SMEFiT is released together with documentation, tutorials, and post-analysis reporting tools, and can be used to carry out state-of-the-art EFT fits of Higgs, top quark, and electroweak production data. To illustrate its functionalities, we reproduce the results of the recent ATLAS EFT interpretation of Higgs and electroweak data from Run II and demonstrate how equivalent results are obtained in two different operator bases.

PhD Student

yes

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Presenter: GIANI, Tommaso

Session Classification: Tuesday AM1

Contribution ID: **8** Type: **not specified**

Precision LHC processes to O(1/Lambdaˆ4)

Monday 19 June 2023 09:45 (25 minutes)

The geometric re-organization of the SMEFT (geoSMEFT) has facilitated calculations of higher order corrections O(1/\Lambdaˆ4) and beyond to important collider processes. These higher order results can be used as laboratories for truncation uncertainty/EFT validity. In this talk, I will highlight some of the takeaway messages, focusing on O(1/\Lambdaˆ4) calculations of Drell Yan, associated Higgs production, and diboson production.

PhD Student

no

Primary author: MARTIN, Adam Orion (University of Notre Dame (US))

Presenter: MARTIN, Adam Orion (University of Notre Dame (US))

Session Classification: Monday AM1

Contribution ID: **10** Type: **not specified**

EFT analysis of light-quark semileptonic transitions and the Cabibbo anomaly

Tuesday 20 June 2023 14:50 (17 minutes)

This talk is based on the results of *JHEP* **04** (2022) 152. In this article, an analysis of light-quark semileptonic transitions is carried out in an Effective Field Theory framework. That is, model-independent bounds on new physics are obtained for the following data sets: semi-leptonic tau decays, pion decays, kaon decays and nuclear beta decays. Subsecuently, a global combination of these bounds is performed, resulting in constraints on new physics for the light-quark sector involving all three lepton families. The interplay of this result with the so-called Cabibbo Anomalies is then explored.

PhD Student

yes

Primary author: DÍAZ CALDERÓN, David

Presenter: DÍAZ CALDERÓN, David

Session Classification: Tuesday PM1

Contribution ID: **11** Type: **not specified**

Top-quark couplings at current and future colliders

Tuesday 20 June 2023 17:25 (25 minutes)

In this work the prospects for measurements of the top-quark couplings at future colliders are presented. Projections are presented for the high luminosity phase of the Large Hadron Collider and a future Higgs/electroweak/top factory lepton collider. Results are presented for the expected bounds on Wilson coefficients of the relevant SMEFT operators from a global fit to the top-quark sector.

PhD Student

no

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Presenter: MIRALLES, Victor (INFN sezione di Roma)

Session Classification: Tuesday PM2

Contribution ID: **12** Type: **not specified**

The Importance of Flavor in SMEFT Electroweak Precision Fits

Tuesday 20 June 2023 14:00 (17 minutes)

Effective field theory tools are essential for exploring non-Standard Model physics at the LHC in the absence of the discovery of new light particles. Predictions for observables are typically made at the lowest order in the QCD and electroweak expansions in the Standard Model effective field theory (SMEFT) and often ignore the effects of flavor. In this talk I will present results for electroweak precision observables (EWPOs) at the next-to-leading order QCD and electroweak expansions (NLO) of the SMEFT with an arbitrary flavor structure for the fermion operators. Numerical NLO SMEFT fits to EWPOs have a strong dependence on the assumed flavor structures and I will show this using various popular assumptions for flavor symmetries, including Minimal Flavor Violation (MFV) and $U(3)^5$.

PhD Student

yes

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Presenter: BELLAFRONTE, LUIGI (IGFAE)

Session Classification: Tuesday PM1

Contribution ID: **13** Type: **not specified**

Opportunistic CP violation

Tuesday 20 June 2023 15:10 (25 minutes)

In the electroweak sector of the Standard Model, CP violation arises through a very particular interplay between the three quark generations, as described by the CKM mechanism and the single Jarlskog invariant J_4. Once generalized to the Standard Model Effective Field Theory (SMEFT), this peculiar pattern gets modified by higher-dimensional operators, whose associated Wilson coefficients are usually split into CP-even and odd parts. However, CP violation at dimension four, i.e., at the lowest order in the EFT expansion, blurs this distinction: any Wilson coefficient can interfere with J_4 and mediate CP violation. In this talk, I will characterize such interferences at first order in the SMEFT expansion, and explain how to capture the associated parameter space via a set of 1551 linear CP-odd flavor invariants. This construction describes both new, genuinely CP-violating quantities as well as the interference between J_4 and CP-conserving ones, a behaviour we dubbed opportunistic CP violation.

PhD Student

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Presenter: GENDY ABD EL SAYED, Emanuele

Session Classification: Tuesday PM1

Contribution ID: **15** Type: **not specified**

One-loop IR/UV dictionary in the SMEFT

Wednesday 21 June 2023 09:00 (25 minutes)

Effective field theories offer a rationale for the classification of heavy new physics models based on the size of their contribution to the effective Lagrangian and therefore to experimental observables. When trying to connect theory with experiment, dictionaries which relate possible UV scenarios with the relevant effective interactions are of utmost importance.
In this talk, I will report on the first step towards the calculation of the one-loop, dimension 6 IR/UV dictionary in the SMEFT. We consider dimension-six operators in the SMEFT that cannot be generated at tree-level in weakly-coupled extensions of the Standard Model, meaning that their leading contribution arises at one-loop. These correspond to operators with field strength tensors, all of which can have important phenomenological consequences. We provide a complete classification of renormalizable extensions of the Standard Model with new scalar and fermion fields that contribute to these operators at one-loop order, together with their explicit contribution. These results are encoded in a Mathematica package called SOLD.
I will further explore a particular phenomenological application of this setup, by exploring the possible UV scenarios responsible for a recently reported tension in non-leptonic B-decays.

PhD Student

no

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Presenter: GUEDES, Guilherme (DESY)

Session Classification: Wednesday AM1

Contribution ID: **16** Type: **not specified**

The top quark legacy of the LHC Run II for PDF and SMEFT analyses

Tuesday 20 June 2023 17:55 (17 minutes)

We assess the impact of top quark production at the LHC on global analyses of parton distributions (PDFs) and of Wilson coefficients in the SMEFT, both separately and in the framework of a joint interpretation. We consider the broadest top quark dataset to date containing all available measurements based on the full Run II luminosity. First, we determine the constraints that this dataset provides on the large-x gluon PDF and study its consistency with other gluon-sensitive measurements. Second, we carry out a SMEFT interpretation of the same dataset using state-of-the-art SM and EFT theory calculations, resulting in bounds on 25 Wilson coefficients modifying top quark interactions. Subsequently, we integrate the two analyses within the SIMUnet approach to realise a simultaneous determination of the SMEFT PDFs and the EFT coefficients and identify regions in the parameter space where their interplay is most phenomenologically relevant. We also demonstrate how to separate eventual BSM signals from QCD effects in the interpretation of top quark measurements at the LHC.

PhD Student

yes

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Presenter: MOORE, James

Session Classification: Tuesday PM2

Contribution ID: **17** Type: **not specified**

SMEFT corrections to the DGLAP equations

Tuesday 20 June 2023 09:30 (17 minutes)

The DGLAP equations describe how parton distribution functions evolve between different energy scales. In this talk, I will discuss how potential effects of New Physics, parametrised in terms of higher dimensional operators in the Standard Model Effective Field Theory, could affect these equations. We assess the importance of these operators in the calculation of the splitting functions, and their potential effects on the running of the strong coupling.

PhD Student

Primary authors: Dr MANTANI, Luca; MORALES, Manuel; Prof. UBIALI, Maria

Presenter: MORALES, Manuel

Session Classification: Tuesday AM1

Contribution ID: **18** Type: **not specified**

From Dilaton Effective Field Theory to the Composite Higgs

Wednesday 21 June 2023 14:30 (25 minutes)

In this talk, I review recent work developing dilaton effective field theory (EFT), which provides a framework for describing the Higgs boson as composite state. The EFT describes a multiplet of pseudo-Goldstone bosons which arise when an approximate global symmetry gets spontaneously broken, as well as a dilaton - a pseudo-Goldstone boson arising from the spontaneous breaking of an approximate conformal symmetry. The interactions of these states are then powerfully constrained by symmetry principles and power counting rules. The EFT has been checked against results from lattice gauge theory and used to build novel composite Higgs models in which the real world Higgs is an admixture of both the dilaton and one state from the multiplet of pseudo-Goldstone bosons.

PhD Student

no

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Presenter: INGOLDBY, James (ICTP (Trieste))

Session Classification: Wednesday PM1

Contribution ID: **20** Type: **not specified**

Mapping the SMEFT to UV models for four-fermion operators

Wednesday 21 June 2023 11:50 (17 minutes)

The top-down matching of specific scenarios for new physics onto the Standard Model Effective Field Theory (SMEFT) is well-understood and easy to automise.
The inverse approach, however, the bottom-up matching of the SMEFT to UV models and in particular a systematic exploration of these discoverable UV models is more difficult.
I will present a diagrammatic technique for the automated construction of a complete (under certain, well specified assumptions) set of possible UV models that produce specific groups of SMEFT operators.
The focus lies on generating models which only contribute to 4F operators at one-loop order and not at tree-level, since these models can contain relatively light particles that could be discovered at the LHC in direct searches and lead to an interesting interplay between indirect SMEFT and direct collider searches.
To avoid stable charged relics these models will contain either so-called exits, particles that couple linearly to a pair of SM particles, or electrically neutral possible DM candidates.
Examples for minimal models for 4F operators will be discussed for both options, as well as their matching to the SMEFT and their role in the interplay between direct and indirect searches at the LHC.

PhD Student

yes

Primary author: ESSER, Fabian

Presenter: ESSER, Fabian

Session Classification: Wednesday AM2

Contribution ID: **21** Type: **not specified**

Dark Photon bounds in the dark EFT

Wednesday 21 June 2023 15:00 (17 minutes)

Dark photons are massive abelian gauge bosons that interact with ordinary photons via a kinetic mixing with the hypercharge field strength tensor. This theory is probed by a variety of different experiments and limits are set on a combination of the dark photon mass and kinetic mixing parameter. These limits can however be strongly modified by the presence of additional heavy degrees of freedom. Using the framework of effective field theories, I will show in this talk how robust the current experiments are when these new states are present. In particular, I focus on the possible existence of a dark dipole between standard model leptons and the dark photon and discuss UV extensions that can realize such scenario. Then, I will show that, under certain assumptions, the presence of this dipole can drastically change supernovae and terrestrial experiments up to cut-off scales of 100 TeV and 3 TeV, respectively. For terrestrial experiments, the modified bounds can even extend down to vanishing kinetic mixing.

PhD Student

yes

Primary author: MASSONI SALLA, Gabriel

Presenter: MASSONI SALLA, Gabriel

Session Classification: Wednesday PM1

Contribution ID: **22** Type: **not specified**

Efficiently Constructing Generic Effective Field Theories of Massive Fields

Monday 19 June 2023 17:45 (25 minutes)

Massive field EFTs are widely used in particle physics, but how to construct massive field operators efficiently remains a challenge. We propose a general theory to solve this problem based on the scattering amplitude theory. We find that the complete set of EFT bases can be systematically constructed using the Lorentz subgroup SU(2) and global symmetry U(N), where N represents the number of external particles. After reducing their dimension to the lowest, the resulting amplitude bases can be mapped into operator bases of massive fields. With this theory, all operator bases of massive fields with any spins can be constructed by computer programs automatically.

PhD Student

no

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Presenters: MA, Teng; Mr MA, Teng (Institut de Física d'Altes Energies (IFAE))

Session Classification: Monday PM2

Contribution ID: **23** Type: **not specified**

Renormalization of scalar effective field theories

Monday 19 June 2023 15:30 (17 minutes)

Based on [2105.12742, 2303.07391] and upcoming work, I will discuss various aspects of the renormalization of scalar effective field theory (EFT). For single insertions of EFT operators, we computed anomalous dimensions at five loop order and high mass dimension using the R* method. For multiple insertions, we present three-loop results and a general non-renormalization theorem that dictates many zeros in the anomalous dimensions. Further zeros are found in the basis of conformal primaries, which I will motivate as a preferred type of basis to expose the structure of anomalous dimensions. Finally, I will discuss how these methods and results extend to other theories, such as the Standard Model EFT.

PhD Student

yes

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Presenter: ROOSMALE NEPVEU, Jasper (Humboldt University Berlin)

Session Classification: Monday PM1

Contribution ID: **24** Type: **not specified**

Evanescent Operators in (SM)EFT Matching

Wednesday 21 June 2023 09:30 (25 minutes)

The low-energy phenomenology of high-scale new physics is best captured with effective field theories (EFTs). Evanescent operators - operators that vanish in 4D - show up at intermediate steps in the matching calculations used to determine the specific EFT coefficients. Although seemingly unphysical, evanescent operators lead to finite physical effects, which must be accounted for. This behavior is exemplified with a 2HDM toy model demonstrating the necessity of consistent treatment of the evanescent pieces. I will proceed to discuss how to systematically remove all evanescent operators from an EFT and present results for all possible evanescent contributions to the Standard Model EFT at one-loop order.

PhD Student

no

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Presenter: THOMSEN, Anders Eller (Universität Basel)

Session Classification: Wednesday AM1

Contribution ID: **25** Type: **not specified**

Mapping the SMEFT one-loop structure of linear SM extensions

Wednesday 21 June 2023 10:00 (25 minutes)

Linear Standard Model (SM) extensions, defined as new particles that can couple linearly to SM fields, form a motivated subset of simplified models for exploring phenomenology beyond the SM (BSM). Their linear couplings enable them to be singly produced at colliders and searched for directly. To take full advantage of the complementarity between direct searches at high energy and indirect constraints at lower energies, we may integrate out the heavy BSM particles to obtain their effects in the SM Effective Field Theory (SMEFT) framework, parametrised by the Wilson coefficients of higher-dimensional operators. In this talk we map the one-loop dimension-6 SMEFT structure of the scalar and fermion linear SM extensions, extending the results previously obtained at tree level in the literature.

PhD Student

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Presenter: GARGALIONIS, John (The University of Melbourne)

Session Classification: Wednesday AM1

Contribution ID: **26** Type: **not specified**

Cosmological history of the HEFT

Monday 19 June 2023 12:05 (17 minutes)

The Standard Model Effective Field Theory (SMEFT), where the Higgs doublet transforms linearly under electroweak symmetry, has gained popularity in the last decade for classifying the low-energy effects of heavy, new physics on experimental results. However, the SMEFT is not as general an Effective Field Theory as the Higgs EFT (HEFT), where the Higgs doublet transforms non-linearly. The universe, as always, is reluctant to reveal it's secrets: is it SMEFT or HEFT/SMEFT? Particle colliders will certainly shed some light on this dichotomy, yet they can only probe near the vacuum. We turn instead to cosmology, specifically the gravitational waves that may have been produced in an early universe phase transition, and could provide us with a new lens with which to resolve the SMEFT or HEFT/SMEFT dichotomy, and the nature of electroweak symmetry breaking.

PhD Student

yes

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Presenter: WEST, MIA,ROBIN,BYRON

Session Classification: Monday AM2

Contribution ID: **27** Type: **not specified**

Jet Bundle Geometry of Higher Derivative EFTs

Monday 19 June 2023 10:15 (17 minutes)

Recent theory developments showed that the interplay between HEFT and SMEFT can be conveniently studied using differential geometry methods, where non-derivative field redefinitions are interpreted as coordinate changes on a 4D manifold. This approach is typically restricted to the study of the 2-derivative Lagrangian.
We introduce a possible strategy to extend the geometric interpretation to terms with 4 or more derivatives by employing the formalism of jet bundles, where field derivatives are treated as independent coordinates on a higher-dimensional manifold.
The talk will give a quick introduction to jet bundles and present preliminary results about the correspondence between metrics on jet bundles and the Lagrangian formulation of a toy EFT.

PhD Student

yes

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Presenter: ALMINAWI, Mohammad

Session Classification: Monday AM1

Contribution ID: **28** Type: **not specified**

SmeftFR v3 - a tool for creating and handling vertices in SMEFT to the 1/Λˆ4 order

Wednesday 21 June 2023 12:10 (17 minutes)

SmeftFR v3 [2302.01353, https://www.fuw.edu.pl/smeft/] enables derivation of Feynman rules for interaction vertices from the dimension-5, dimension-6 and (so far) all bosonic dimension-8 SMEFT operators which can be further easily used in numerical or symbolic calculations e.g. in Madgraph or FeynArts. There are many changes in comparison to the previous version of the code and its scope of utility can be very broad. In my talk I will discuss general principles of how the program works and describe in a greater detail some of its most important new features, such as choosing among and using one of the predetermined input schemes (including one for CKM matrix). I will then present practical examples of the usage of SmeftFR v3 on some specific processes in which 1/Λˆ4 corrections may play a significant role.

PhD Student

yes

Primary author: RYCZKOWSKI, Michal

Presenter: RYCZKOWSKI, Michal

Session Classification: Wednesday AM2

Contribution ID: **29** Type: **not specified**

Learning about axion-like particles from SMEFT

Wednesday 21 June 2023 14:00 (25 minutes)

In the presence of axions and axion-like particles (ALPs) that couple to the Standard Model via non-renormalisable dimension-5 operators, non-zero Wilson coefficients (WCs) of the Standard Model effective field theory (SMEFT) are induced by renormalisation group evolution. Since many of the SMEFT WCs are experimentally constrained, this ALP-SMEFT interference allows to derive indirect bounds on the ALP couplings to SM particles.
In this talk, we reinterpret bounds on the SMEFT to perform a global analysis of the WCs of the ALP EFT. The obtained bounds are independent of the mass of the ALP. They are competitive with direct (collider) bounds in the O(GeV) – O(TeV) ALP-mass range.

PhD Student

no

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Presenter: BIEKOETTER, Anke (JGU Mainz)

Session Classification: Wednesday PM1

Contribution ID: **30** Type: **not specified**

Electroweak input schemes and universal corrections in SMEFT

Tuesday 20 June 2023 12:10 (17 minutes)

The choice of an electroweak (EW) input scheme is an important component of perturbative calculations in Standard Model Effective Field Theory (SMEFT). We perform a systematic study of three different EW input schemes in SMEFT, in particular those using the parameter sets $\{M_W,\, M_Z,\, G_F\}$, $\{M_W,\, M_Z,\, \alpha\}$, or $\{\alpha,\, M_Z,\, G_F\}$. We discuss general features and calculate decay rates of Z and W bosons to leptons and Higgs decays to bottom quarks in these three schemes up to next-to-leading order (NLO) in dimension-6 SMEFT. We explore the sensitivity to Wilson coefficients and perturbative convergence in the different schemes, and show that while the latter point is more involved than in the Standard Model, the dominant scheme-dependent NLO corrections are universal and can be taken into account by a simple set of substitutions on the leading-order results. Residual NLO corrections are then of similar size between the different input schemes, and performing calculations in multiple schemes can give a useful handle on theory uncertainties in SMEFT predictions and fits to data.

PhD Student

yes

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Presenter: SMITH, Tommy

Session Classification: Tuesday AM2

Contribution ID: **31** Type: **not specified**

One-loop fermion corrections to VBS scattering

Tuesday 20 June 2023 11:50 (17 minutes)

We study the one-loop corrections to Vector Boson Scattering within the framework of effective theories. We focus our attention on fermion-loop corrections which scale like $\mathcal{O}(s/v^4)$ in the Higgs Effective Field Theory (HEFT). Although this dependency is formally suppressed for $s \to \infty$ with respect to that from boson loops, the large top mass can lead to a numerical competition between fermion and boson loops at intermediate energies of the order of a few TeV. For the study of these fermion effects we have calculated loops of top and bottom quarks in $W^+W^- \to W^+W^-$ elastic scattering and compared it to the loop contributions from purely bosonic loops.

PhD Student

yes

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Presenter: Mr QUEZADA CALONGE, Carlos (Universidad Complutense de Madrid)

Session Classification: Tuesday AM2

Contribution ID: **35** Type: **not specified**

EFT highlights

Monday 19 June 2023 09:10 (30 minutes)

PhD Student

Presenter: DURIEUX, Gauthier (CERN)

Session Classification: Monday AM1

Contribution ID: **36** Type: **not specified**

Higgs as portal to dark sector EFTs

Monday 19 June 2023 11:35 (25 minutes)

PhD Student

Presenter: SALVIONI, Ennio (Universita e INFN, Padova (IT))

Session Classification: Monday AM2

Contribution ID: **37** Type: **not specified**

EFT interpretations of Higgs measurements

Monday 19 June 2023 11:00 (30 minutes)

PhD Student

Presenter: ROSSI, Eleonora (University of Oxford (GB))

Session Classification: Monday AM2

Contribution ID: **38** Type: **not specified**

Hilbert series, the Higgs Mechanism and HEFT

Monday 19 June 2023 14:00 (25 minutes)

PhD Student

Presenter: HENNING, Brian Quinn

Session Classification: Monday PM1

Contribution ID: **39** Type: **not specified**

Anomaly Cancellation in Effective Field Theories From the Covariant Derivative Expansion

Monday 19 June 2023 14:30 (25 minutes)

PhD Student

Presenter: LU, Xiaochuan (University of Oregon)

Session Classification: Monday PM1

Contribution ID: **40** Type: **not specified**

Constraints on anomalous dimensions from the positivity of the S-matrix

Monday 19 June 2023 16:15 (25 minutes)

PhD Student

Presenter: CHALA, Mikael (Universidad de Granada)

Session Classification: Monday PM2

Contribution ID: **41** Type: **not specified**

An EFT hunter's guide to 2-to-2 scattering: HEFT and SMEFT on-shell amplitudes

Monday 19 June 2023 16:45 (25 minutes)

PhD Student

Presenter: LIU, Hongkai (University of Pittsburgh (US))

Session Classification: Monday PM2

Contribution ID: **42** Type: **not specified**

Full Unitarity and the Moments of Scattering Amplitudes

Monday 19 June 2023 17:15 (25 minutes)

PhD Student

Presenter: RIEMBAU SAPERAS, Marc (CERN)

Session Classification: Monday PM2

Contribution ID: **43** Type: **not specified**

EFT analysis of New Physics at COHERENT

Tuesday 20 June 2023 11:00 (25 minutes)

PhD Student

Presenter: GONZALEZ-ALONSO, Martin (CERN)

Session Classification: Tuesday AM2

Contribution ID: **44** Type: **not specified**

Rare b decays meet high-mass Drell-Yan

Tuesday 20 June 2023 14:20 (25 minutes)

PhD Student

Presenter: SMOLKOVIC, Aleks

Session Classification: Tuesday PM1

Contribution ID: **45** Type: **not specified**

EFT interpretations of top measurements

Tuesday 20 June 2023 16:00 (30 minutes)

PhD Student

Presenter: SKOVPEN, Kirill (Ghent University (BE))

Session Classification: Tuesday PM2

Contribution ID: **46** Type: **not specified**

Matchete

Wednesday 21 June 2023 11:00 (25 minutes)

PhD Student

Presenter: PAGÈS, Julie (University of California, San Diego)

Session Classification: Wednesday AM2

Contribution ID: **47** Type: **not specified**

Introduction, Welcome

Monday 19 June 2023 09:00 (10 minutes)

PhD Student

Presenter: VRYONIDOU, Eleni (University of Manchester (GB))

Session Classification: Monday AM1

Contribution ID: **48** Type: **not specified**

LHC EFT Working Group efforts

Tuesday 20 June 2023 16:35 (15 minutes)

Presenter: BRIVIO, Ilaria (University of Zurich)

Session Classification: Tuesday PM2