

Cen Zhang 张岑
30 May 1984 – 9 June 2021

Cen and HEFT

2021 Hefei+online: local organiser
with Meng Xiao, Yusheng Wu,
and Shuang-Yong Zhou

2019 Louvain: organisation commity

2018 Mainz: EW top loops in Higgs processes

2016 Copenhagen: SMEFT at NLO in QCD

2014 Madrid: Global EFT for top FCNCs

Subject: HEFT 2022
Date: Wed, 3 Jun 2020 20:53:59 +0800
From: Cen Zhang <cenzhang@ihep.ac.cn>

Dear HEFT LOCs,

We are writing to express our interest in hosting the HEFT 2022 workshop, in Beijing, China. In fact, we were interested in hosting the next workshop in 2021, but we have heard that, due to the covid, the University of Granada and the 2020 LOC would like to have another go in hosting the HEFT 2021. If this is the case, we will still be interested in the one after, HEFT 2022.



Copenhagen, 29 Oct. 2016

Scientific trajectory

2002–06 BSc, Peking U.

2006–11 P

2012–14 P

2014–17 P

since 17 A



"Cen Zhang Outstanding Research Scholarship"
donated by Xianqing Cen and Ming Zhang, 4 March 2022
(with Yuanning Gao, dean of the School of Physics, Peking U.)

I am so impressed with Cen that I sometimes say that I have not figured out yet what he cannot do. He is an expert in collider physics, precision electroweak physics, and perturbative QCD, both at

loop level, and he is able to think about and apply new techniques and broadly interdisciplinary areas and find interesting problems to make. He is so confident that you can trust his judgment. He is honest when he says he doesn't know something (which is a good sign) until he understands the principles.

Scott Willenbrock

Scientific trajectory

2002–06 BSc, Peking U.

2006–11 PhD, Urbana Champaign

2012–14 PD, UCLouvain

2014–17 PD, Brookhaven

since 17 Associate prof., IHEP & UCAS

I am so impressed with Cen that I sometimes say that I have not figured out yet what he cannot do. He is an expert in collider physics, precision electroweak physics, and perturbative QCD, both at tree level and one-loop level, and he is very fast to learn and apply new techniques. He is creative and broadly interested in physics. He has continued to branch out into new areas and find important contributions to make. He is so thorough and careful that you can trust his results, and he is honest when he doesn't understand something (which is rare). He thinks deeply about physics, and is not satisfied until he understands things from first principles.

Scott Willenbrock

Work

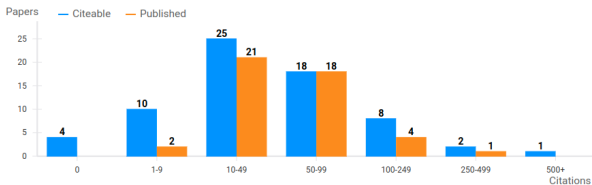


Collaborators

- Fabio Maltoni 11
- Eleni Vryonidou 10
- Shuang-Yong Zhou 9
- Nicolas Greiner 5
- Scott Willenbrock 5
- Hooman Davoudiasl 4
- Celine Degrande 4
- Gauthier Durieux 4
- Diogo Buarque Franzosi 3
- Harrison Mebane 3
- Pier Paolo Giardino 3
- Ken Mimasu 3
- Scott S. Willenbrock 3
- Juan Rojo 2

<https://inspirehep.net/authors/1333165>

	Citeable [?]	Published [?]
Papers	68	46
Citations	5,668	2,853
h-index [?]	37	31
Citations/paper (avg)	83.4	62



SMEFTs living on the edge: determining the UV theories from positivity and extremality #1
Cen Zhang (Beijing, Inst. High Energy Phys. and Beijing, GUCAS and Peking U., CHEP) (Dec 21, 2021)
e-Print: 2112.11665 [hep-ph]
[pdf](#) [cite](#) [?] 10 citations

Constraining $qq\bar{t}$ operators from four-top production: a case for enhanced EFT sensitivity #1
Cen Zhang (Beijing, Inst. High Energy Phys.) (Aug 19, 2017)
Published in: *Chin. Phys. C* 42 (2018) 2, 023104 - e-Print: 1708.05928 [hep-ph]
[pdf](#) [DOI](#) [cite](#) [?] 40 citations

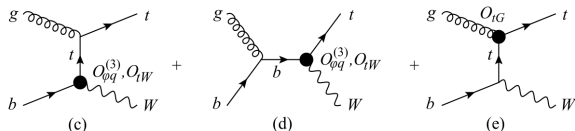
Single Top Production at Next-to-Leading Order in the Standard Model Effective Field Theory #2
Cen Zhang (Brookhaven Natl. Lab.) (Jan 22, 2016)
Published in: *Phys.Rev.Lett.* 116 (2016) 16, 162002 - e-Print: 1601.06163 [hep-ph]
[pdf](#) [DOI](#) [cite](#) [?] 68 citations

Effective field theory approach to top-quark decay at next-to-leading order in QCD #3
Cen Zhang (Louvain U., CP3) (Apr 4, 2014)
Published in: *Phys.Rev.D* 90 (2014) 1, 014008 - e-Print: 1404.1264 [hep-ph]
[pdf](#) [DOI](#) [cite](#) [?] 59 citations

A SMEFT pioneer

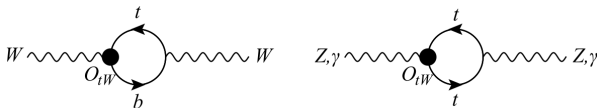
First paper on top EFT production and decay
(5 days before the Warsaw basis paper)

[Zhang, Willenbrock '10]



First loops were out on the following year

[Greiner, Willenbrock, Zhang '11]



(also computed $h \rightarrow \gamma\gamma$ in unitary gauge [Marciano, Zhang, Willenbrock '11])

and then fitted to EWPD (8 top ops + S, T)

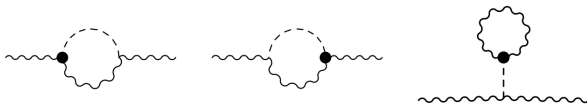
[Greiner, Willenbrock, Zhang '12]

More loops would follow...

Oblique corrections from EW operators

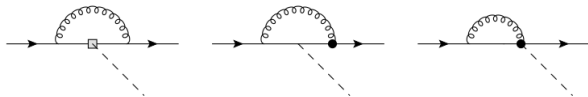
[Mebane, Greiner, Zhang, Willenbrock '13 '13]

[Chen, Dawson, Zhang '13]



Top to Higgs FCNC decay

[Zhang, Maltoni '13]



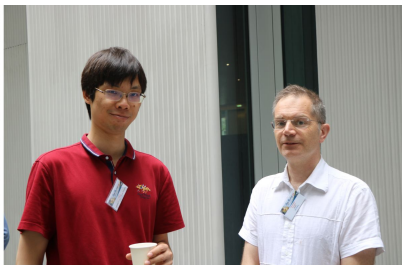
and all top decays (incl. 4-fermion, FCNC, etc.)

[Zhang '14]

$$\frac{d\Gamma_{be+\nu}}{dQ^2 d\cos\theta} = \frac{Q^2}{16\pi^2} \frac{g^2}{2} |D(Q^2, m_W, \Gamma_W)|^{-2} \times$$
$$\sum_{i=+,0,-} \Gamma_{bW}^{(i)}(x, C_{\varphi Q}^{(3)'}, C_{\varphi\varphi}, C_{tW}, C_{bW}, C_{tG}) f_i(\cos\theta)$$

... and a 30-page review

- 1 Introduction
- 2 Operator basis
- 3 Weak boson pair production
- 4 Flavor
- 5 Beyond S and T
- 6 Precision Electroweak Measurements
- 7 Constraints at One Loop
- 8 Higgs boson
- 9 Final Thoughts



Higgs Hunting 2019, Paris

During the Xmas vacation 2013-2014, I was in Barcelona at ICREA. Cen and Scott had just come out with the paper Effective Field Theory Beyond the Standard Model and I remember Alex Pomarol telling me:

“Finally, someone who understands what needs to be done for the EFT!”

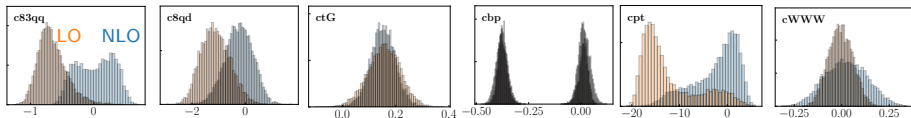
Christophe Grojean

NLO automation...

- top FCNC production [Degrande, Maltoni, Wang, Zhang '14]
- top pair production with chromo dipole [Buarque Franzosi, Zhang '15]
- single-top production [Zhang '16]
- ttZ [Bessidskaia Bylund, Maltoni, Tsirikos, Vryonidou, Zhang '16]
- tth [Maltoni, Vryonidou, Zhang '16]
- tZq, thq [Degrande, Maltoni, Mimasu, Vryonidou, Zhang '18]
- EW top loops in Higgs processes [Vryonidou, Zhang '18]
- $e^+e^- \rightarrow t\bar{t}$ incl. CPV EW dipoles [Durieux, Perelló, Vos, Zhang '18]
- EW top loops in $e^+e^- \rightarrow W^+W^-$ [Durieux, Gu, Vryonidou, Zhang '18]
- SMEFT@NLO [Degrande, Durieux, Maltoni, Mimasu, Vryonidou, Zhang '20]

...used in global analyses

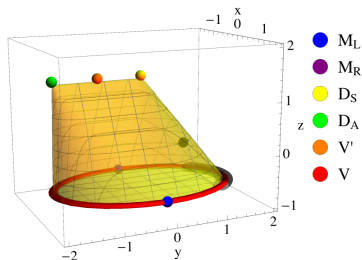
- top FCNCs [Durieux, Maltoni, Zhang '14]
- top sector [Hartland, Maltoni, Nocera, Rojo, Slade, Vryonidou, Zhang '19]
- top sector [Brivio, Bruggisser, Maltoni, Moutafis, Plehn, Vryonidou, Westhoff, Zhang '19]
- top + Higgs + diboson [Ethier, Magni, Maltoni, Mantani, Nocera, Rojo, Slade, Vryonidou, Zhang '21]



- top + top loops in EWPD (beyond oblique) [Liu, Wang, Zhang, Zhang, Gu '22]

Positivity

- VBS [Zhang, Zhou '18]
- aQGC [Bi, Zhang, Zhou '19]
- χpT [Wang, Guo, Zhang, Zhou '20]
- convex geometry [Zhang, Zhou '20]
- $e^+e^- \rightarrow e^+e^-$ [Fuks, Liu, Zhang, Zhou '20]
- extremal positivity in transverse VBS [Yamashita, Zhang, Zhou '20]
- $e^+e^- \rightarrow \gamma\gamma$ [Gu, Wang, Zhang '20]
- generalised elastic positivity for massive spin-2 [Wang, Zhang, Zhou '20]
- multifield [Li, Xu, Yang, Zhang, Zhou '21]
- triple crossing [Du, Zhang, Zhou '21]
- "SMEFTs living on the edge" [Zhang '21]
recomposition from PDF file and final editing by
Jiayin Gu, Xu Li, Jiang-Hao Yu, Hao Zhang and Shuang-Yong Zhou
- Drell-Yan moments [Li, Mimasu, Yamashita, Yang, Zhang, Zhou '22]



A humble, generous, joyful friend,
a meticulous, passionate and insightful colleague,
quietly passed away a year ago.

His legacy lives on.