

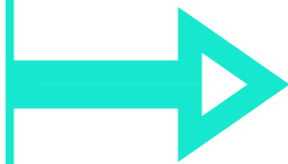
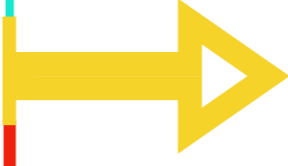
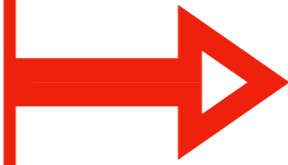
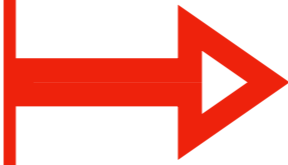
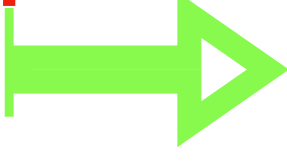
The electro-weak couplings of the top and bottom quarks

- Top-Quark Physics at the CLIC Electron-Positron Linear Collider: **arXiv:1807.02441**
- Global and optimal probes for the top-quark effective field theory at future lepton colliders: **arXiv:1807.02121**
- The electro-weak couplings of the top and bottom quarks – global fit and future prospects: **arXiv:1907.10619v2**

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Effective Field Theory

dim-6 EW 2-fermion operators

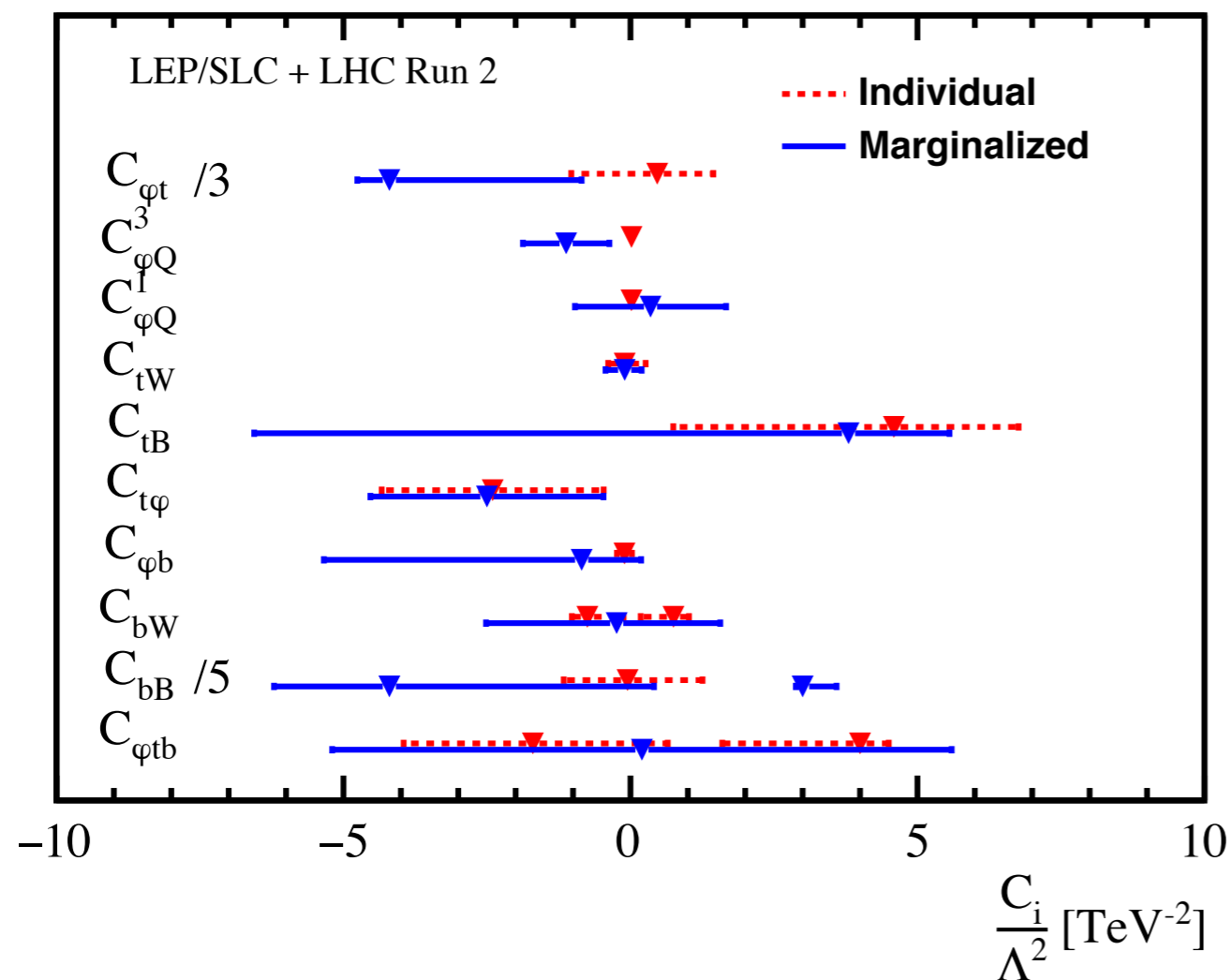
$O_{\varphi Q}^1$	$\equiv \frac{y_t^2}{2}$	$\bar{q}\gamma^\mu q$	$\varphi^\dagger i\overleftrightarrow{D}_\mu\varphi,$		Left- and right-handed couplings of the t- and b-quarks to the Z-boson
$O_{\varphi Q}^3$	$\equiv \frac{y_t^2}{2}$	$\bar{q}\tau^I\gamma^\mu q$	$\varphi^\dagger i\overleftrightarrow{D}_\mu^I\varphi,$		
$O_{\varphi u}$	$\equiv \frac{y_t^2}{2}$	$\bar{u}\gamma^\mu u$	$\varphi^\dagger i\overleftrightarrow{D}_\mu\varphi,$		
$O_{\varphi d}$	$\equiv \frac{y_t^2}{2}$	$\bar{d}\gamma^\mu d$	$\varphi^\dagger i\overleftrightarrow{D}_\mu\varphi,$		
$O_{\varphi ud}$	$\equiv \frac{y_t^2}{2}$	$\bar{u}\gamma^\mu d$	$\varphi^T \epsilon i D_\mu\varphi,$		Charged current interaction
O_{uW}	$\equiv y_t g_W$	$\bar{q}\tau^I\sigma^{\mu\nu} u$	$\epsilon\varphi^* W_{\mu\nu}^I,$		EW dipole operators
O_{dW}	$\equiv y_t g_W$	$\bar{q}\tau^I\sigma^{\mu\nu} d$	$\epsilon\varphi^* W_{\mu\nu}^I,$		
O_{uB}	$\equiv y_t g_Y$	$\bar{q}\sigma^{\mu\nu} u$	$\epsilon\varphi^* B_{\mu\nu},$		EW dipole operators
O_{dB}	$\equiv y_t g_Y$	$\bar{q}\sigma^{\mu\nu} d$	$\epsilon\varphi^* B_{\mu\nu},$		
$O_{u\varphi}$	\equiv	$\bar{q}u$	$\epsilon\varphi^* \varphi^\dagger\varphi,$		Top Yukawa

We can extend this basis by adding contact interactions.

Current bounds: 10-parameter fit

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Bayesian fit (HEPfit open source): 68% probability.

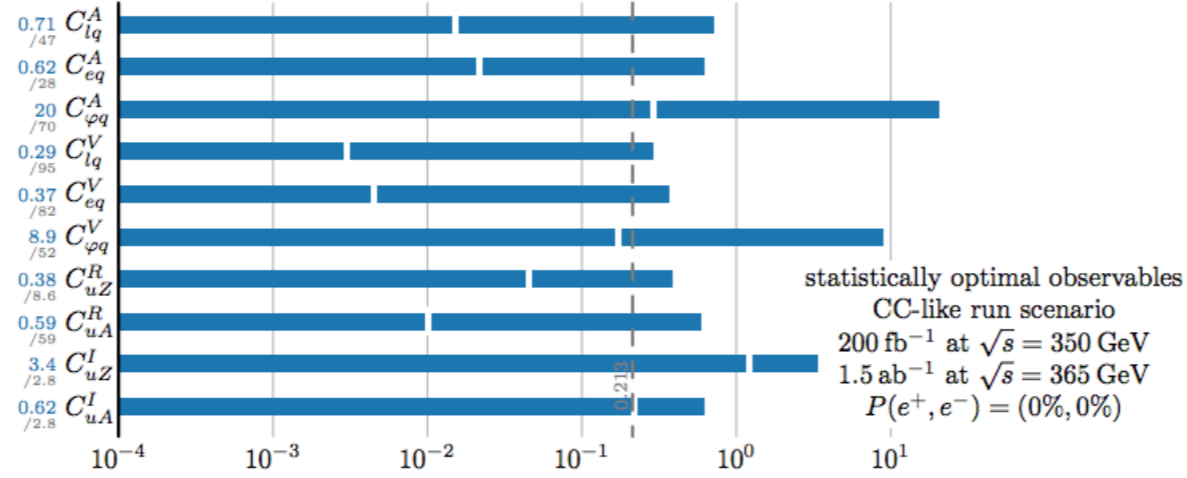
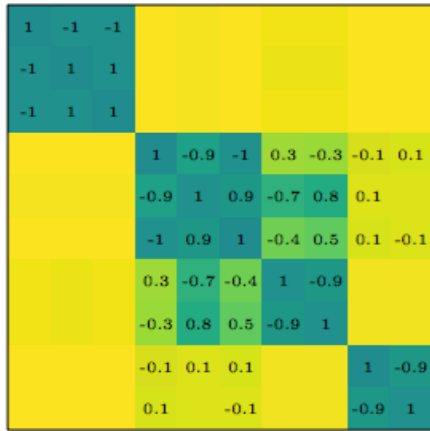


Work in progress (M. Miralles, V. Miralles, M. Moreno Llácer, A. Peñuelas, MP, M. Vos):

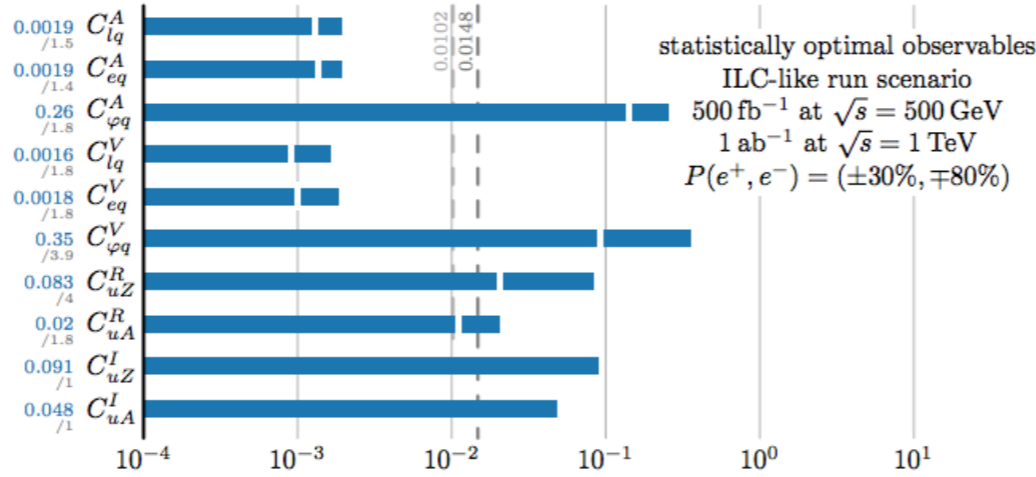
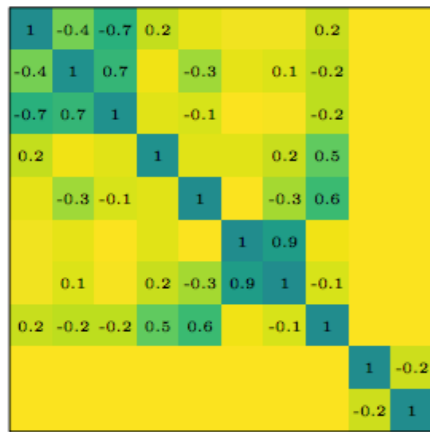
- Update inputs from ATLAS and CMS.
- Include differential measurements of ttZ and $t\bar{t}\gamma$ rates.

Exploring future scenarios, arXiv:1807.02121

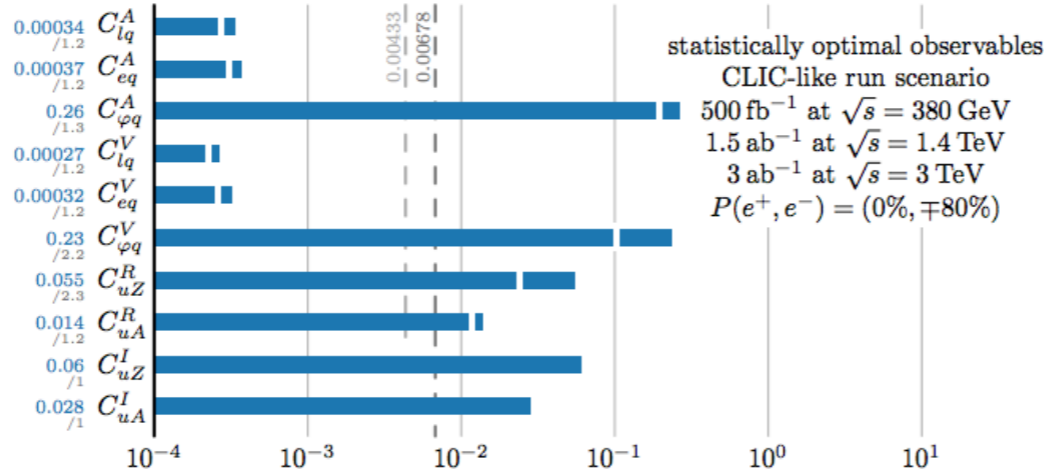
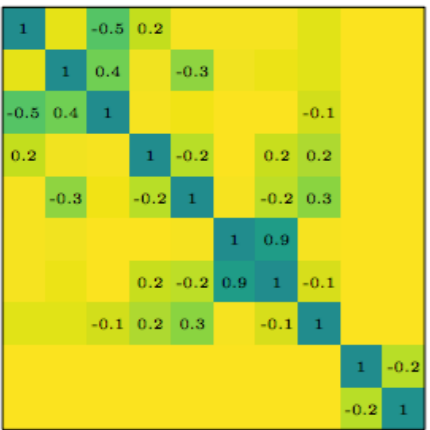
CC



ILC



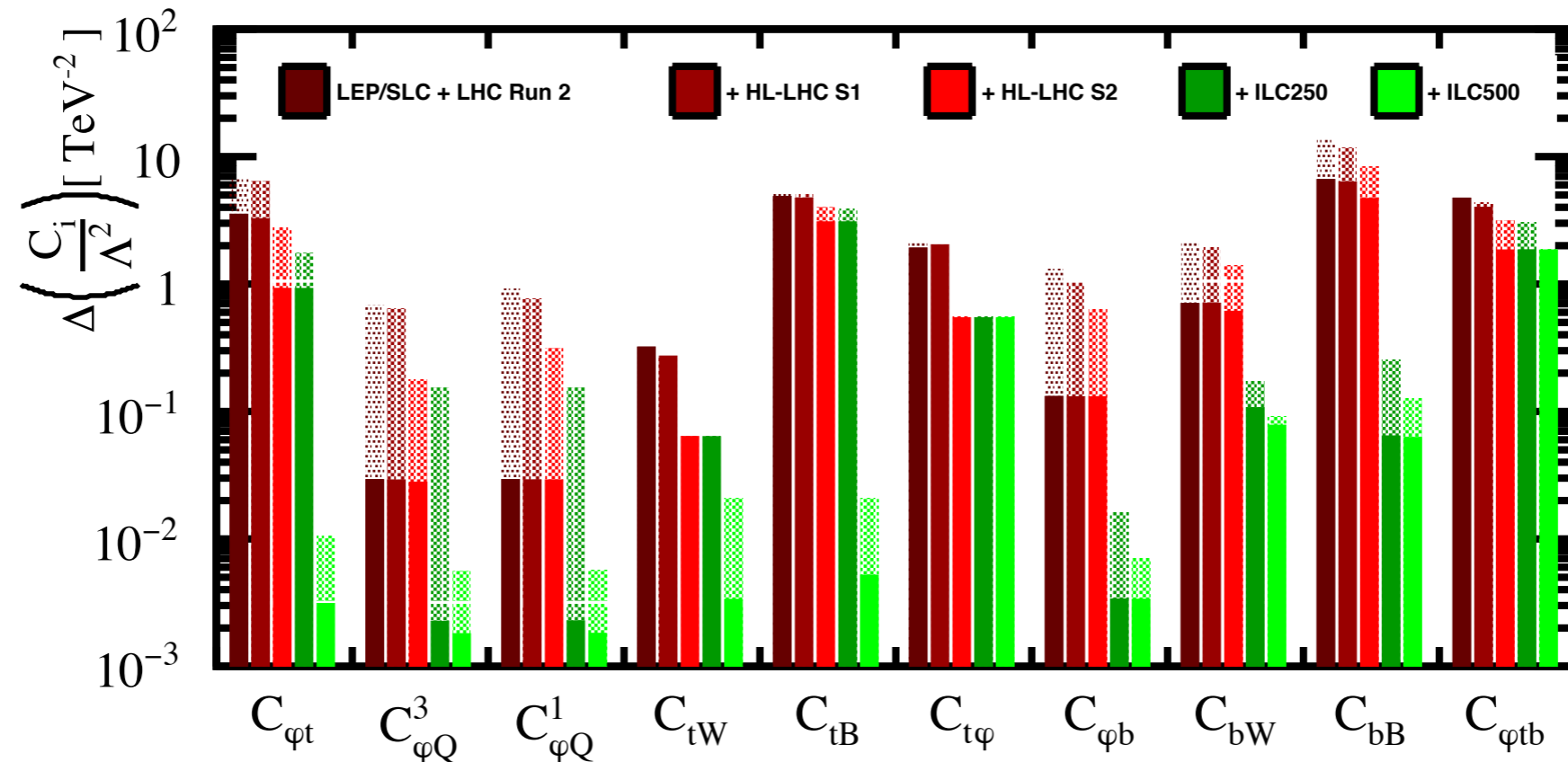
CLIC



**CLICdp collaboration:
 arXiv:1807.02441**

Prospects

- The electro-weak couplings of the top and bottom quarks – global fit and future prospects: [arXiv:1907.10619v2](https://arxiv.org/abs/1907.10619v2)



Soon:

- Higgs and top precision physics at future e+e- colliders; a combined effective field theory analysis with renormalization mixing (*S. Jun, J. Lee, MP, J. Tian, M. Vos*).