

Abstract Submitted  
for the CUWIP22 Meeting of  
The American Physical Society

**Constraining the Space of Standard Model Effective Field Theory Using Geometric Methods** VALERIE WU, Reed College, YUCHEN YANG, University of Cambridge, SHUANGYONG ZHOU, Peng Huanwu Center for Fundamental Theory, University of Science and Technology China, CEN ZHANG, Theoretical Physics Division, Institute of High Energy Physics, the Chinese Academy of Sciences — Standard Model Effective Field Theory(SMEFT) is an approach to search for Physics beyond the Standard Model. This project focuses on constraining the parameter space of dimension-8 operator coefficients in SMEFT, since their experimental effects are important in determining UV-completeness. The parameter space of the dim-8 operator is a convex cone dual to a spectrahedron. Finding the boundaries of this convex cone is equivalent to finding the extremal ray(ER) of its dual spectrahedron. Previous research has found the analytic solution to the ER of this spectrahedron for small degrees of freedom ( $n=2, 3$ ). The present work aims to find the analytic solution for larger degrees of freedom. Numerical methods were developed to find ER for larger  $n$ . From the numerical solutions, we proposed conjectures for general analytic solutions. The conjectures for  $n=4$  and  $\text{rank} = 2$  have been proved thoroughly, and several other cases, such as  $n=5, 6$  and  $\text{rank} = 3$  have been understood by extending the ideas from the proofs. Present analysis suggests that a general analytic solution for all  $n$  is not promising. Current and future work consists in investigating special cases with more physical relevance.

Valerie Wu  
Reed College

Date submitted: 11 Jan 2022

Electronic form version 1.4