



西南交通大学

“创源”大讲堂研究生学术讲座

报告题目: Orientifold Calabi-Yau threefolds: Constructions and Machine Learning

报告人: 高昕研究员 (四川大学)

报告时间: 2024年10月17日上午10点-11点

报告地点: 西南交通大学犀浦校区X30456



报告摘要: Using the Kreuzer-Skarke database of 4-dimensional reflexive polytopes, we systematically constructed a new database of orientifold Calabi-Yau threefolds up to $h^{1,1}(X)=12$. Our approach involved a non-trivial $\mathbb{Z}_2$ involution, with both divisor exchanging and multi-reflections, acting on the Calabi-Yau manifolds. Each of such proper involutions will result in an orientifold Calabi-Yau manifolds and 320,386,067 of them was constructed. We developed a novel algorithm that significantly reduces the complexity of determining the fixed locus under the involutions, followed by the locations of different types of O-planes. It shows that under the proper involutions one end up with majority the O3/O7-planes system and most of them will further admit a naive Type IIB string vacua. Additionally, a new type of free action was determined. We also computed the smoothness and the splitting of Hodge numbers for these orientifold Calabi-Yau threefolds. Finally, We use the machine learning technique to search the polytope which can result in an orientifold Calabi-Yau hypersurface and the “naive type IIB string vacua”.