

Title: Probing the set of complex 3D bases in 4D F-theory and N=1 SCFT

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Abstract: 4D F-theory is a geometric description of IIB superstring theory using an elliptically fibered Calabi-Yau fourfold over complex threefold bases. Despite of the importance of 4D F-theory in string phenomenological constructions, the geometric classification of these threefold bases was largely untouched. I am going to present our recent explorations of the set of topologically distinct smooth compact threefold bases. We probed the subgraph of toric threefold bases where the edges are blow up maps at different curves and points. We can see the structure of this graph more clearly by separating the bases into “resolvable bases” and “good bases”. The resolvable bases could lead to a 4D N=1 superconformal fix point with 4D conformal matter, while the good bases give rise to 4D N=1 supergravity theories. It turns out that the good bases form isolated “islands” and “continents” within the connected “ocean” of resolvable bases. I am also going to present some local geometric features of these bases, and their relevance to 4D N=1 SCFTs.