BPS Quivers on Orbifolds: From BPS Spectra to New 5d SCFTs

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In this talk I will report new results that sharpen our understanding of five-dimensional SQFTs and their geometric engineering via M-theory on local Calabi–Yau threefolds, using their BPS quivers as the main tool.

First, I will present a theorem explaining how to induce stability conditions on (resolved) orbifolds of local CY3s. This provides a new approach to constructing Bridgeland stability conditions for local Calabi–Yau threefolds with compact divisors (i.e. interacting physical theories), and it allows to describe the BPS spectrum of these substantially more complicated geometries in terms of the simpler space being orbifolded.

As an application, I will give a closed formula for the spectrum of stable BPS states and for the Kontsevich–Soibelman wall-crossing invariant for the local Calabi–Yau threefolds Y^{(N,0)} for any N. This reproduces, for N=2, the case of local \mathbb{P}^1 \times \mathbb{P}^1, which we previously derived with P. Longhi by different methods.

While much of the existing understanding of five-dimensional QFTs has relied on toric Calabi–Yau threefolds, the techniques presented here do not rely on toric constructions. I will show that they can be used to generate infinitely many new five-dimensional theories from orbifolds of non-toric geometries, including a surprising infinite family of rank-1 theories that evades all known classifications.