The no Andreas Conjecture



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The conjecture

No Andreas Conjecture:

"every paper without Andreas as an author is in the swampland"



The proof

- A paper is in the landscape if its results are robust with parametric control
 - → the paper has to live at the boundary of moduli space where

$N_{authors} \rightarrow \infty$

→ infinitely many independent checks on the results make them trustable

• Violation of coauthors' entropy bound which gives maximum number of coauthors who can coexist in a collaboration without having a fight among scientists with opposite personality



The counterexample

• Way-out: entropy bound removed when Andreas is present in the collaboration

 $N_{authors}^{max} \rightarrow \infty$

- can take large number of coauthors' limit since Andreas makes everyone feel comfortable and can make scientists with opposite personality coexist!
- any paper with Andreas as a coauthor can live at the boundary of moduli space!



Best wishes Andreas!!!

A great collaboration

- Privilege of a very fruitful collaboration with Andreas
- Met Andreas in 2009 when I was a postdoc at DESY
- 3 papers together on different topics:



Hidden photons from string theory

Testing string vacua in the lab: from a hidden CMB to dark forces in flux compactifications Michele Cicoli, Mark Goodsell, Joerg Jaeckel and Andreas Ringwald JHEP 07 (2011) 114

- Pheno of hidden photons with kinetic mixing with ordinary photons in type IIB string compactifications
- Stueckelberg mass from Green-Schwarz mechanism
- Moduli stabilisation and D-terms from gauge fluxes on D-branes
- Two classes of Calabi-Yau examples: isotropic and anisotropic extra-dimensions
- Anisotropic case: (i) GeV-scale γ ' for intermediate-scale strings \longrightarrow beam dump experiments

(ii) meV-scale γ ' for TeV-scale strings

LSTW experiments



Axion-like particles from string theory

The type IIB string axiverse and its low-energy phenomenology Michele Cicoli, Mark Goodsell and Andreas Ringwald JHEP 10 (2012) 146

- Pheno of closed string axions in type IIB orientifold compactifications
- Interplay between axiverse of light axions and moduli stabilisation
- Explicit Calabi-Yau examples: Large Volume Scenarios with QCD axion and ALPs
- Derivation of axion mass spectrum and couplings to matter and gauge fields
- Bounds from cosmology, astrophysics and lab searches (DM, isocurvature, birefringence, stellar emission, conversion of astro photon fluxes, BH superradiance,..)



Very best wishes for everything!!!

