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String Theory in Greater Paris

Rencontres Théoriciennes

“Supergravité, théorie des cordes et théorie M”

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LPTHE

Towards understanding the minimal weak gravity conjecture

The weak gravity conjecture asserts that any consistent gauge theory coupled to quantum gravity should exhibit so-called super-extremal particles, i.e. states whose charge-to-mass ratio exceeds that of an extremal black hole. On the other hand, a stronger variant of this conjecture is the tower weak gravity conjecture, which predicts an infinite tower of super-extremal states in every direction of the charge lattice of the theory under consideration. This formulation ensures that the weak gravity conjecture remains consistent under circle reduction of a given theory. However, in string theory compactifications on Calabi-Yau threefolds, there are instances where no tower of super-extremal particle states appears to be present. To address this issue, I will discuss recent developments in our understanding of the tower weak gravity conjecture leading to the Minimal Weak Gravity Conjecture, which states that towers of super-extremal particles occur if and only if they are required by consistency of the weak gravity conjecture under dimensional reduction.

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