Quantum Gravity Bounds on Axion Physics

Tom Rudelius*[1]

[1]Durham University – United Kingdom

Abstract

The Axion Weak Gravity Conjecture provides one of the most effective quantum gravity tools for constraining particle physics and cosmology, but it has long been viewed as a somewhat fuzzy statement due to the presence of an unknown, order-one constant. In this talk, I will present three complementary approaches that allow us to fix this order-one constant in different corners of the string landscape. We will see that these three approaches agree in their overlapping domains of validity, and they allow us to strengthen the recent bounds derived by Maldacena-Maloney-McPeak and Di Ubaldo-Iliesiu-Lin-Yan using the gravitational path integral. I will also derive an upper bound on the string scale in terms of axion decay constants and instanton actions in compactifications of Type IIB string theory.

*Speaker