



Contribution ID: 66

Type: **Parallel talk**

What is the Magnetic Weak Gravity Conjecture for Axions?

Tuesday, 20 June 2017 16:45 (15 minutes)

The electric Weak Gravity Conjecture demands that axions with large decay constant f couple to light instantons. The resulting large instantonic corrections pose problems for natural inflation. We explore an alternative argument based on the magnetic Weak Gravity Conjecture for axions, which we try to make more precise. Roughly speaking, it demands that the minimally charged string coupled to the dual 2-form-field exists in the effective theory. Most naively, such large- f strings curve space too much to exist as static solutions, thus ruling out large- f axions. More conservatively, one might allow non-static string solutions to play the role of the required charged objects. In this case, topological inflation would save the superplanckian axion. Furthermore, a large- f axion may appear in the low-energy effective theory based on two subplanckian axions in the UV. The resulting effective string is a composite object built from several elementary strings and domain walls.

Presentation type

Parallel talk

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Session Classification: Parallel II