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Low Energy? Think Positive!

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At low energies, the world around us can be accurately described using the Standard Model. However, this is at best only an “effective” description: valid at low energies but destined to break down as experiments probe increasingly higher energies, ultimately requiring a new (UV complete) theory to take over.

In this talk, I will demonstrate that certain constraints must be placed on such low-energy Effective Field Theories if they are to have a smooth UV completion at high energies (which is unitary, causal and local). These constraints are known as “positivity bounds”, and apply to a wide variety of Effective Field Theories in particle physics and cosmology.

As an illustrative example, I’ll show how these bounds can be used to constrain Beyond the Standard Model physics (parametrized by higher derivative operators in the Standard Model Effective Field Theory), improving future fits to data by identifying a small region of parameter space for which there is a strong theoretical prior.

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