

Preface

Strong dynamics constitutes one of the pillars of the standard model of particle interactions, and it accounts for the bulk of the visible matter in the universe. It is therefore a well-posed question to ask if the rest of the universe can be described in terms of new highly natural four-dimensional strongly coupled theories. The goal is to provide a coherent overview of how new strong dynamics can be employed to address the relevant challenges in particle physics and cosmology from composite Higgs dynamics to dark matter and inflation. We will first introduce the topic of dynamical breaking of the electroweak symmetry also known as technicolor. The knowledge of the phase diagram of strongly coupled theories plays a fundamental role when trying to construct viable extensions of the standard model. Therefore, we present the state-of-the-art of the phase diagram for gauge theories as function of the number of colors, flavors, matter representation, and gauge group. Recent extensions of the standard model featuring minimal technicolor theories are then introduced as relevant examples. We finally show how technicolor or in general new strongly coupled theories can lead to natural candidates of composite dark matter and inflation.

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Francesco Sannino

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Towards a Composite Universe

Sannino, F.

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