

### Successes of Naturalness

*Friday, 2 March 2018 14:00 (40 minutes)*

Undeniably, the naturalness principle, acting as a guiding principle, has had a major role in particle physics during the last decades, in particular in model building. Nowadays, one can find a wide range of different definitions, some of them seem mutually exclusive, but traditionally its notion has been linked to the fine-tuning problem. Its operational definition can be stated as the imposition that the fine-tuning problem has to vanish, for instance, due to the existence of new particles in the scale in which fine-tuning problems start to appear. Therefore, in order to palliate the fine-tuning problem that the Higgs sector of the standard model seems to suffer, new physics should have already appeared in the last LHC run. Its persistence has originated numerous works exploring both, the limits and the different conceptual definitions of naturalness. However, little work has been done re-examining precisely one of the main pillars naturalness advocates: its historical successes. Given the current period in which the critics to the naturalness principle are undergoing, it is important to explore the historical examples often cited in literature, primarily the charm quark proposal and its mass prediction and how they are related to the fine-tuning problem in the Higgs sector.

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