

# Naturalness and Analogies to Condensed Matter Physics

*Friday, 2 March 2018 15:00 (40 minutes)*

Over the past century, a fruitful strategy for constructing new models in both particle physics and condensed matter physics has been to develop analogies between theories for the two domains. Two of the theoretical components at the heart of naturalness arguments in particle physics were inspired by analogies with condensed matter physics: renormalization group (RG) methods (which are central to the effective field theory approach) and spontaneous symmetry breaking. In both cases, the analogies are purely formal. That is, the analogical mappings between the particle and condensed matter physics models relate elements that play similar formal roles in the mathematical structures, and there are no underlying physical analogies between the mapped elements. In fact, there are substantial physical disanalogies between analogous elements of the models. After surveying some of the relevant pragmatic, empirical, and physical differences between applications of the formalisms in the two domains, I will critically examine the role that analogies to condensed matter physics play in naturalness arguments in particle physics.

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