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## **[314] Dimensional mismatch theories and confinement**

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Gauge theories play a fundamental role in physics, from high energy (e.g the Standard Model) to condensed matter (e.g. as effective low energy theories of many-body Hamiltonians).

Dimensional mismatch theories are a particular example of this. These models are characterized by gauge fields that live in an higher dimensions than the matter fields.

After an overview of the application of these models, we focus our attention on 1+1 dimensional fermions interacting with higher dimensional  $U(1)$  gauge fields. We show that confinement, present for the case of  $1+1$  gauge fields, survives when gauge fields live in higher dimensions. This contradicts the naive intuition that, when the gauge fields are in  $3+1$  dimensions, the fermions should deconfine, as it happens for QED.

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