Laboratoire de Physique Théorique et Hautes Energies

Unité Mixte de Recherche (UMR 7589) de Sorbonne Université et du CNRS

SEMINAIRE du LPTHE

Vendredi 22 Mars 2019, 11:00

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Anisotropic gauge theories : from chiral fermions to new phases of matter

We review the effect of introducing anisotropic couplings for lattice gauge theories and show that these can lead to new, "layered", phases, beyond the bulk confining and Coulomb phases, known in abelian gauge theories. The new phases can be interpreted as describing the effects of flux compactifications and generalize the Kaluza-Klein paradigm of extra dimensions. Extra dimensions have been, in fact, used to describe defects in condensed matter systems and anisotropic gauge theories can be also understood as allowing the description of more elaborate defects.

Coupling matter to the gauge fields leads to a consistent, non-perturbative, description of chiral fermions, provided the anomalies are properly cancelled, and can describe edge states and their currents while scalar fields lead to a quite elaborate phase diagram. The challenges of assembling these ingredients to study supersymmetric theories will be touched on, as a way of describing how such systems can be consistently closed, a la Parisi-Sourlas.

Bibliothèque du LPTHE, tour 13/14, 4ème étage

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