

Symmetry breaking in 3d QED

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QED in 2+1 dimensions is among the simplest and yet very rich examples of strongly interacting gauge theories, arising in many physical contexts. When the number of electrons is large, the theory is known to flow to a symmetry-preserving interacting CFT at low energies, but there is evidence that this scenario is excluded below some critical value of the number of electrons. Focusing on the case of two electrons, we argue that the theory must then spontaneously break its $U(2)$ global symmetry to a $U(1)$ subgroup via the condensation of monopole operators. This gives rise to a non-linear sigma model with target space a squashed three-sphere, equipped with a theta term required by anomaly matching. Time permitting, I will also discuss how this scenario is consistent with deformations of supersymmetric QED with eight supercharges.

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