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D-Branes and Noncommutative Field Theory

(5 Lectures)

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We analyse in detail some classical solutions of noncommutative field theory and how they may be understood as states of D-branes in Type II superstring theory. Both scalar field theory and gauge theory in Moyal noncommutative space are extensively studied. Instantons in Yang-Mills theory on the two-dimensional noncommutative torus and the fuzzy sphere are also constructed. In some instances the connection to D-brane physics is provided by a novel mapping of noncommutative solitons into K-homology.