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Wonderful models in Quantum Field Theory

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In the position space formulation of QFT renormalization translates into an extension problem for distributions, as shown by Epstein and Glaser already in the early seventies. Quite recently a more geometric approach to this problem was introduced by Bergbauer, Brunetti and Kreimer, using so-called wonderful models of subspace arrangements. These models provide a systematic way to resolve the singularities of distributions associated to Feynman graphs and allow thus to define canonical extension operators. In this talk I will explain the 'wonderful renormalization' process and show how the poset of divergent subgraphs serves as the main tool to describe the construction of wonderful models and renormalization operators. We will see that both procedures are determined by the combinatorics of this poset. Not only simplifies this the exposition considerably, but it also allows to explore the renormalization group in this setting, i.e. to study how the renormalized distributions depend on the data that has to be fixed in the definition of the extension operators.