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Superconformal Operator Product Expansion and General Gauge Mediation

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It is well known that in conformal theories the two- and three-point functions of a subset of the local operators-the conformal primaries-suffice, via the operator product expansion (OPE), to determine all local correlation functions of operators. It is less well known that, in superconformal theories, the OPE of superdescendants is generally undetermined from those of the superprimaries, and there is no universal notion of superconformal blocks. We recall these and related aspects of 4d (S)CFTs, and then we focus on the super operator product expansion (sOPE) of conserved currents in 4d N=1 SCFTs. The current-current OPE J(x)J(0) has applications to general gauge mediation. We show how superconformal symmetry, when combined with current conservation, determines the OPE coefficients of superconformal descendants in terms of those of the superconformal primaries. We show that only integer-spin real superconformal primary operators of vanishing R-charge, and their descendants, appear in the sOPE. We also discuss superconformal blocks for four-point functions of the conserved currents.

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