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The integer quantum Hall plateau transition is a current algebra after all

The scaling behavior near the transition between plateaus of the Integer Quantum Hall Effect (IQHE) has traditionally been interpreted on the basis of a two-parameter renormalization group flow conjectured from Pruisken's non-linear sigma model. Yet, the conformal field theory (CFT) describing the critical point remained elusive, and only fragments of a quantitative analytical understanding existed up to now. Here we carry out a detailed study of the current-current correlation function for the conductivity tensor, initially in the Chalker-Coddington network model for the IQHE plateau transition and then in its exact reformulation as a supersymmetric vertex model. We take the continuum limit of the non-local conductivity response function at criticality and thus identify a non-Abelian current algebra at level $n = 4$. By proposing precise lattice expressions for the CFT primary fields we predict the multifractal scaling exponents of critical wave intensities to be $\Delta_q = q(1-q)/4$.