Commun. Math. Phys. 146, 637–638 (1992)

Communications in
Mathematical
Physics

Erratum

Proof of Chiral Symmetry Breaking in Strongly Coupled Lattice Gauge Theory

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Received January 3, 1992

Commun. Math. Phys. **139**, 395 (1991)

The "constant" C_n in Theorem 3.11 still has a m-dependence; Theorem 3.11 has to be restated as:
For all $m \in \mathscr{W}$ there is a $\kappa(m) > 0$ such that for all $n \in \mathbb{N}$ and $x_1, \ldots, x_n \in \mathbb{Z}^\nu$,

$$|\langle \sigma^L \rangle^T| \leqq \tilde{C}_n B_n(m) e^{-\kappa(m) \vartheta(x_1, \ldots, x_n)}, \tag{1}$$

where $\tilde{C}_n$ depends only on n and m_0 (larger than the inverse radius of convergence of the cluster expansion), and

$$B_n(m) = \begin{cases} \max\{1, |\mathrm{Re}\, m|^{-n}\} & \text{for} \quad |m| \leqq m_0, \\ 1 & \text{for} \quad |m| > m_0. \end{cases} \tag{2}$$

The reason for this is an error in our original proof: the bound $|\langle \sigma^L \rangle| \leqq 1$ which we used holds only for real m. For general $m \in \mathscr{W}$ with $\mathrm{Re}\, m \neq 0$, the monomer-dimer results of Gruber and Kunz [1] imply only the weaker bound

$$|\langle \sigma^L \rangle| \leqq |\mathrm{Re}\, m|^{-|L|}. \tag{3}$$

To prove clustering from this, fix $m' > 0$ and change the definition of u_L to

$$u_L(m) = \frac{1}{\vartheta(L)} \log \left(\frac{|\langle \sigma^L \rangle^T|}{\tilde{C}(L) \max\{1, m'^{-|L|}\}} \right), \tag{4}$$

then $u_L(m) \leqq 0$ for all m with $|\mathrm{Re}\, m| > m'$, $u_L(m) < 0$ for $|m| > m_0$, and u_L is still subharmonic in m, so the Penrose-Lebowitz subharmonicity argument [2] implies $u(m) = \limsup u_L(m) < 0$ for all m with $|\mathrm{Re}\, m| > m'$, as worked out in our paper. Given m with $\mathrm{Re}\, m \neq 0$, Theorem 3.11, as stated above, is then obtained by taking e.g. $m' = \frac{1}{2}|\mathrm{Re}\, m|$. The proof also implies that $\kappa(m)$ is bounded below as $m \to 0$, $\kappa(m) \geqq M |\mathrm{Re}\, m|$ for $|m| \leqq m_0$, where M depends only on m_0.

For real $m \neq 0$ and the two-point function we can get rid of $B_2(m)$:

$$|\langle \sigma_0 \sigma_x \rangle - \langle \sigma_0 \rangle \langle \sigma_x \rangle| \leqq e^{-\kappa(m)|x|}, \tag{5}$$