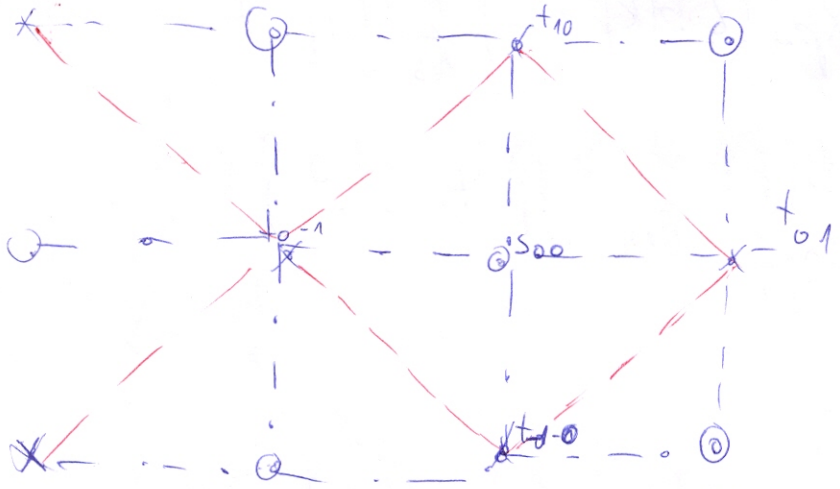
Renormalizacijska grupa: 2D



$$b^d = \frac{N}{N'}$$

$$\underline{\underline{b = \sqrt{2}}}$$

$$H_{original} = -K \sum_n \sum_{NS} S_n S_{n+i} - L \sum_n \sum_{DNS} S_n S_{n+j}$$

↳ Parna vsota za 1 spin ; brez L_j

$1\,spin = S_{00}$

$$Z = \sum_{S_{00}} \exp\left(K S_{00}\left(t_{01} + t_{0-1} + t_{10} + t_{-10}\right)\right) =$$

$$= 2\cosh\left(K\left(t_{01} + t_{0-1} + t_{10} + t_{-10}\right)\right)$$

Propišemo v:

$$= \exp\Big(a(k) + b(k)\big(t_{10}t_{01} + t_{01}t_{10} + t_{10}t_{0-1} + t_{0-1}t_{10} + t_{-10}t_{10} + t_{0-1}t_{01}\big) + c(k)\big(t_{-10}t_{01}t_{10}t_{0-1}\big)$$

$$H' = 2b(k)\sum_{NS} t_i t_j + b(k)\sum_{DNS} t_i t_j + c(k)\sum_{sg} t_{10}t_{01}t_{10}t_{0-1}$$

$Z = Z'$

$$\sum_{\{s\}} \exp(-H) = \sum_{\{s\}} \exp(-H') = \sum_{\{s\}} \exp\Big(\overbrace{(2b(k)+L)}^{K'} \sum_{NS} t_i t_j + \underbrace{b(k)}_{L'} \sum_{Ons} t_i t_j + \dots\Big)$$

$K' = b(k) + L$

$L' = b(k)$

$$b(k) = \ln \cosh(4k)/8 = \frac{1}{8}\ln\left(1 + \frac{x^2}{2!}\right) = \frac{1}{8}\,\frac{16k^2}{2} = k^2$$

$$\boxed{\begin{aligned} K' &= 2K^2 + L \\ L' &= K^2 \end{aligned}}$$

$\Rightarrow$ $(K^*, L^*) = (\infty, \infty)$

$(K^*, L^*) = (0, 0)$

$$\boxed{(K^*, L^*) = \left(\frac{1}{3}, \frac{1}{9}\right)}$$

$dK' = 4K\,dK + dL$

$dL' = 2K\,dk$ $\Rightarrow$ $\begin{bmatrix} \frac{4}{3} & 1 \\ \frac{2}{3} & 0 \end{bmatrix}$ $\Rightarrow$ $\lambda_1 = 1{,}721$, $\lambda_2 = -0{,}387$

$a_1 = \begin{pmatrix} 2{,}581 \\ 1 \end{pmatrix}$

$a_2 = \begin{pmatrix} -0{,}581 \\ 1 \end{pmatrix}$

$\lambda_i = b^{x_i} \Rightarrow x_1 = \frac{\ln \lambda_1}{\ln b} = 1,57$ ~~x_2~~

KRITIČNI EKSPONENTI:

$\alpha = 2 - \frac{d}{x_1} = 0,724$ $\beta, \gamma, \delta, \eta$?

$\nu = \frac{1}{x_1} = 0,638$ $(0,625$ eksp.$)$

* zavadi podvajanja "vdeče" mreže

$$a(k) = \ln 2 + (\ln \cos 4k + 4 \ln \cos 2k)/8$$

$$b(k) = (\ln \cos 4k)/8$$

$$c(k) = (\ln \cosh k - 4 \cdot \ln \cosh 2k)/8$$

a) $t_{01} = t_{10} = 1$

$t_{0-1} = t_{-10} = -1$

$$A = a(k) + b(k)(t_{-10}''^{-1} t_{01}''^{1} + t_{01}''^{1} t_{10}''^{-1} + t_{10}''^{-1} t_{0-1}'^{-1} + t_{0-1}'^{-1} t_{-10}''^{1} + t_{-10}''^{1} t_{10}''^{-1} + t_{0-1}''^{-1} t_{01}''^{1}) + c(k)\, t_{10}''^{-1} t_{01}''^{1} t_{10}''^{-1} t_{0-1}''^{-1}$$

$$= \ln 2 + (\ln \cosh 4k + 4 \ln \cosh 2k)/8 - 2 \cdot (\ln \cosh 4k)/8 + (\ln \cosh 4k - 4 \ln \cosh 2k)/8 =$$

$$= \ln 2$$

$$\Rightarrow$$

$$\exp(\ln 2) = 2 \cdot \cosh(k \cdot 0)$$

$$\underline{\underline{2 = 2}}$$