

# Phase Transitions and Critical Phenomena



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## Exercise Sheet 7

HS 14

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### Problem 1 Gaussian fixed point

Consider the Landau model (the  $\phi^4$ -theory)

$$H = \int d^d \mathbf{r} \left( t\phi^2 + \frac{c}{2} (\nabla\phi)^2 + u\phi^4 \right) \quad (1)$$

and its rescaling by  $\mathbf{r} \mapsto b\mathbf{r}'$  and  $\phi \mapsto b^{-x}\phi'$  with  $x = (d-2)/2$ . This produces the *Gaussian fixed point*  $(0, c, 0)$ .

Show that near the Gaussian fixed point, magnetic field  $h$  transforms as

$$h' = hb^{\frac{d}{2}+1}. \quad (2)$$