

Teaser Question

Basic Training in Condensed-Matter Theory

Eun-Ah Kim; Due Wednesday, Apr 15, 2009

1. Is Ising model quantum mechanical? Y or N

Justify your answer in one sentence.

2. Is Heisenberg model quantum mechanical? Y or N

Justify your answer in one sentence.

3. What is the following integral?

$$\prod_{i=1}^N \int_{-\infty}^{\infty} d\phi_i \exp \left[- \sum_{i,j} \frac{1}{2} \phi_i K_{ij} \phi_j - J \sum_i \phi_i \right]$$

where ϕ_i ($i = 1, \dots, N$) are real variables and K_{ij} is a $N \times N$ matrix and J_i ($i = 1, \dots, N$) is a N -vector.

Answer: