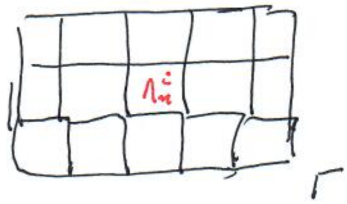
Devo mostrare

$$\mathrm{ent}(\bar{\mu}_n) + u^{\Phi}(\bar{\mu}_n) \xrightarrow{n\to\infty} p(\Phi)$$

$$\mathrm{ent}(\bar{\bar{\mu}}_n) = \lim_{\Gamma \uparrow \mathbb{Z}^d} \frac{1}{|\Gamma|} \mathrm{Ent}(\Pi_\Gamma \bar{\bar{\mu}}_n \mid \rho_\Gamma)$$

Faccio il limite quando Γ è un "multiplo" di Λ_n



$$\frac{1}{|\Gamma|} \mathrm{Ent}\left(\Pi_\Gamma \frac{1}{|\Lambda_n|} \sum_{x \in \Lambda_n} \hat{\mu}_n \circ \vartheta_x \mid \rho_\Gamma\right)$$

$$\underset{\uparrow}{=} \frac{1}{|\Gamma|} \mathrm{Ent}(\hat{\mu}_n \mid \rho_\Gamma) + O\left(\frac{|\partial\Gamma|}{|\Gamma|}\right)$$

argomento per l'affinità di $\mathrm{ent}(\cdot \mid \rho)$

$\hat{\mu}_n$ e ρ_Γ sono prodotto

$$= \frac{1}{|\Lambda_n|} \mathrm{Ent}(\bar{\mu}_{\Lambda_n} \mid \rho_{\Lambda_n}) + O\left(\frac{|\partial\Gamma|}{|\Gamma|}\right)$$

ora è come in volume finito

$$\mathrm{Ent}(\bar{\mu}_{\Lambda_n} \mid \rho_{\Lambda_n}) = \sum_{\omega \in \Omega_{\Lambda_n}} \bar{\mu}_{\Lambda_n}(\omega) \log \frac{\bar{\mu}_{\Lambda_n}(\omega)}{\rho_{\Lambda_n}}$$

$$\rho_{\Lambda_n} = \frac{e^{-H_{\Lambda_n}(\omega)}}{Z_{\Lambda_n}}$$

$$= -U^{\Phi}_{\Lambda_n}(\bar{\mu}_{\Lambda_n}) + \log Z_{\Lambda_n}$$

~~[illegible]~~ quindi

$$\mathrm{ent}(\bar{\mu}_n) + u^{\Phi}(\bar{\mu}_n)$$

$$= \underbrace{-\frac{1}{|\Lambda_n|} U^{\Phi}_{\Lambda_n}(\bar{\mu}_n)} - \underbrace{\frac{1}{|\Lambda_n|} \log Z_{\Lambda_n}}_{\downarrow \atop p(\Phi)} + \underbrace{u^{\Phi}(\bar{\mu}_n)} + \underbrace{O\left(\frac{\partial \Lambda_n}{|\Lambda_n|}\right)}_{\downarrow \atop 0}$$

hanno lo stesso limite

$$\to \quad -p(\Phi)$$