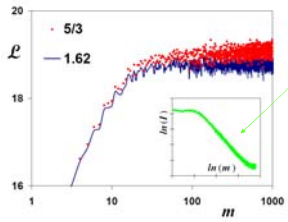
SP phase easy:

RW with reflecting BC, verified as $I \sim 1/\omega^2$

MC phase more interesting: $I \sim 1/\omega^p$

$p = 5/3$ $_{=1+2/3}$ expected from $_{(noisy)}$ Burgers

$ln[\omega^p I] \equiv$



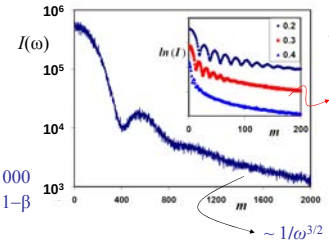
$L = 1000$

$\alpha = \beta = 0.7$

$\omega \equiv 2\pi m/10^6$MCS

HD/LD ("Boring, Gaussian") phase:

Initially, we were most surprised by these spectra!



$L = 32000$

$\alpha = 1-\beta$

$\sim 1/\omega^2$

$L = 1000$

$\alpha = 0.3 = 1-\beta$

$\sim 1/\omega^{3/2}$

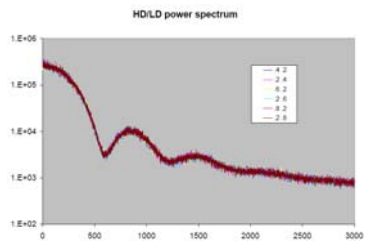
HD/LD phase: data (raw!) collapse

$L = 2000$

$\alpha = 0.2$ many β

or

$\beta = 0.2$ many α



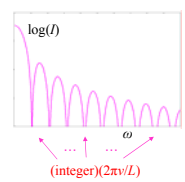
HD/LD phase: some understanding

- Oscillations generic (for finite *L*!):
  - Toy: single particle, constant *v*, random entrances

$$\frac{\partial N}{\partial t} = \sum \left[\delta(t - t_k) - \delta(t - t_k - L/v)\right]$$

$$i\omega\tilde{N} = \sum e^{i\omega t_k}\left[1 - e^{i\omega L/v}\right]$$

$$I = \left\langle \left|\tilde{N}\right|^2 \right\rangle \propto \left[\frac{\sin(\omega L/2v)}{\omega}\right]^2$$



HD/LD phase:

- Oscillations generic (for finite *L*!):
  - Toy: single particle, constant *v*, random entrances
  - Effect of dispersion/diffusion: filling in minima
- Simple minded, linearized Langevin equation:
  - Naïve continuum limit of mean-field:

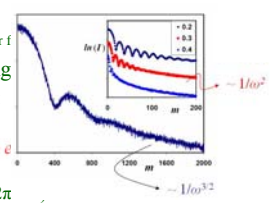
$$\partial_t n(i,t) = n(i-1,t)[1 - n(i,t)] - n(i,t)[1 - n(i+1,t)]$$

$$n(i,t) \to \rho(x,t)$$

HD/LD phase:

- Oscillations generic (for f
- Simple, linearized Lang
  - …*damped oscillations*:

$$I(\omega) \cong \frac{4\pi 4Tv}{\omega^2 D}\left[1 - e\right.$$



  - …minima ~ (integer)(2π
  - …with asymptotics of

$$I(\omega) \to \begin{cases} \omega^{-3/2} & \text{for } D\omega/v^2 \gg 1 \\ \omega^{-2} & \text{for } D\omega/v^2 \ll 1 \end{cases}$$