

Linear response theory: When is it valid and when not?

(with Caroline Wormell)

Mathematicians:

the measure varies roughly with the parameter in simple systems

"Typical low-dim. systems do not obey LRT"

Applied scientists:

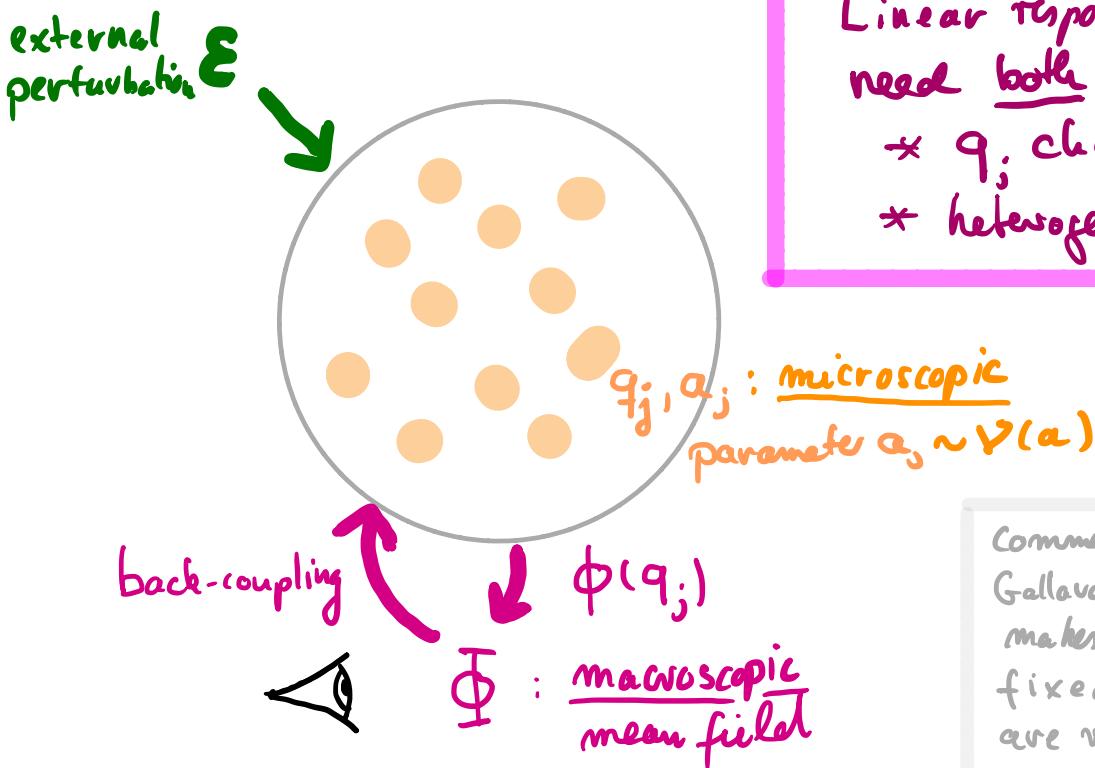
"But it works!" does it?

"Typical high-dim. Systems obey LRT"

?? Can we reconcile these two "facts" ??

Yes!

Consider a high-dimensional system consisting of low-dimensional **subunits** which do not obey LRT



Linear response for $E[\Phi]$
need both:

- * q_j chaotic
- * heterogeneity: $\mathcal{V}(\alpha)$ smooth

Comment on wrong argument:
Gallavotti-Cohen hypothesis makes comments only about fixed E , not on how measures are related when E is varied.



Wormell & GAG, Chaos 29, 113127 (2019)

Wormell & GAG, J Stat Phys 172, 1479 (2018)

GAG, Wormell & Wouters, Physica D 331, 89 (2016)