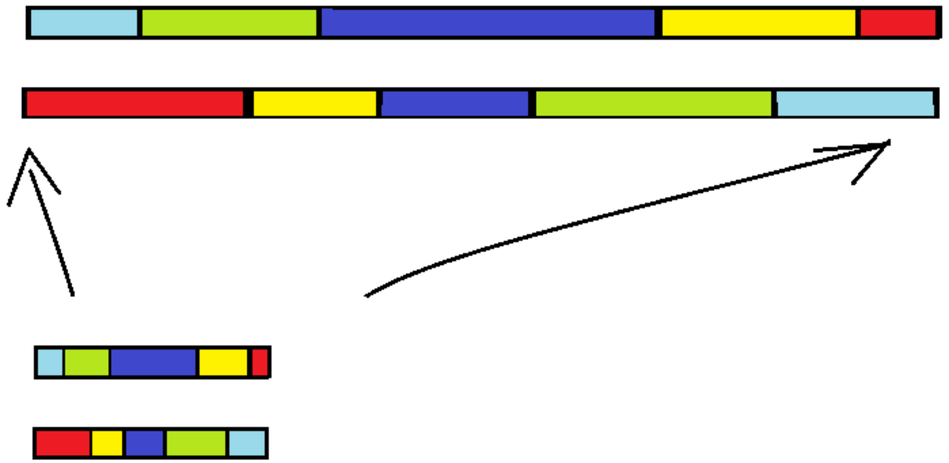
Renormalization in dynamics

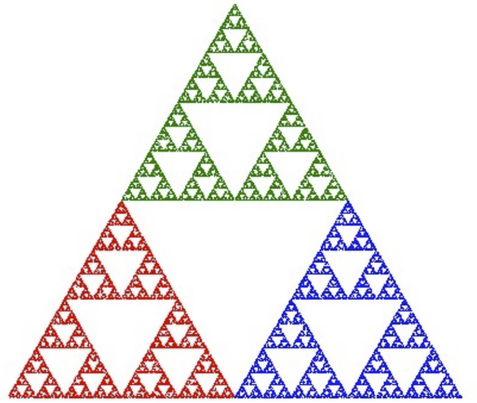
Heuristic idea: **ZOOM IN in and magnify** to analyse multiscale structure

- E.g. Study **renormalization operators** for deterministic maps given by *inducing and rescaling*

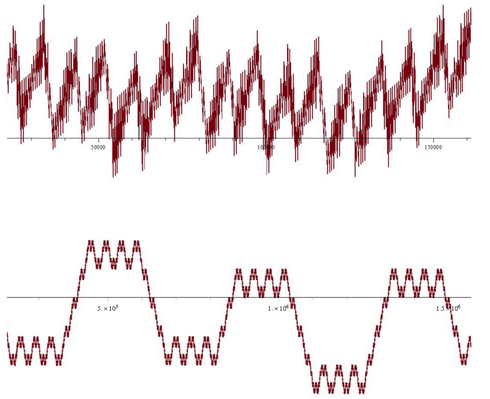


Very successful to study many low complexity/low dimensional systems, e.g

- Circle diffeomorphisms
  Arnold, Herman, Yoccoz 1970s
- One-dimensional dynamics
  (Sullivan-Lyubich-McMullen theory)
- Iterated function systems
- Teichmueller dynamics
  (several Fields medallists)



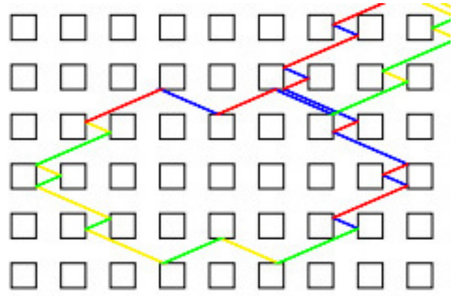
Fractals



Birkhoff sums graphs

Key assumption: **Renormalization is RECURRENT!**

- Special case: fixed point of renormalization (self-similar system)
- Recurrent: the original systems should look similar at all scales;



Ehrenfest trajectory