Quantum Field Theory in De Sitter space-time

the nonperturbative renormalization group

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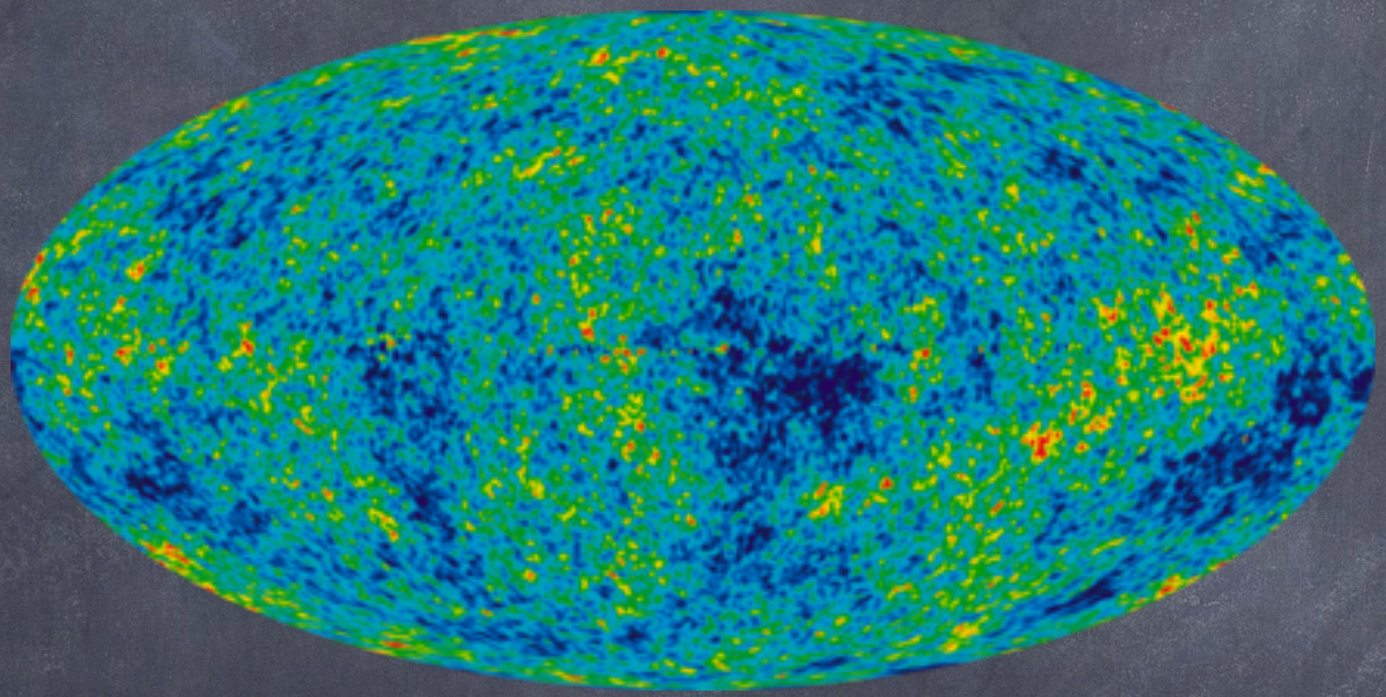
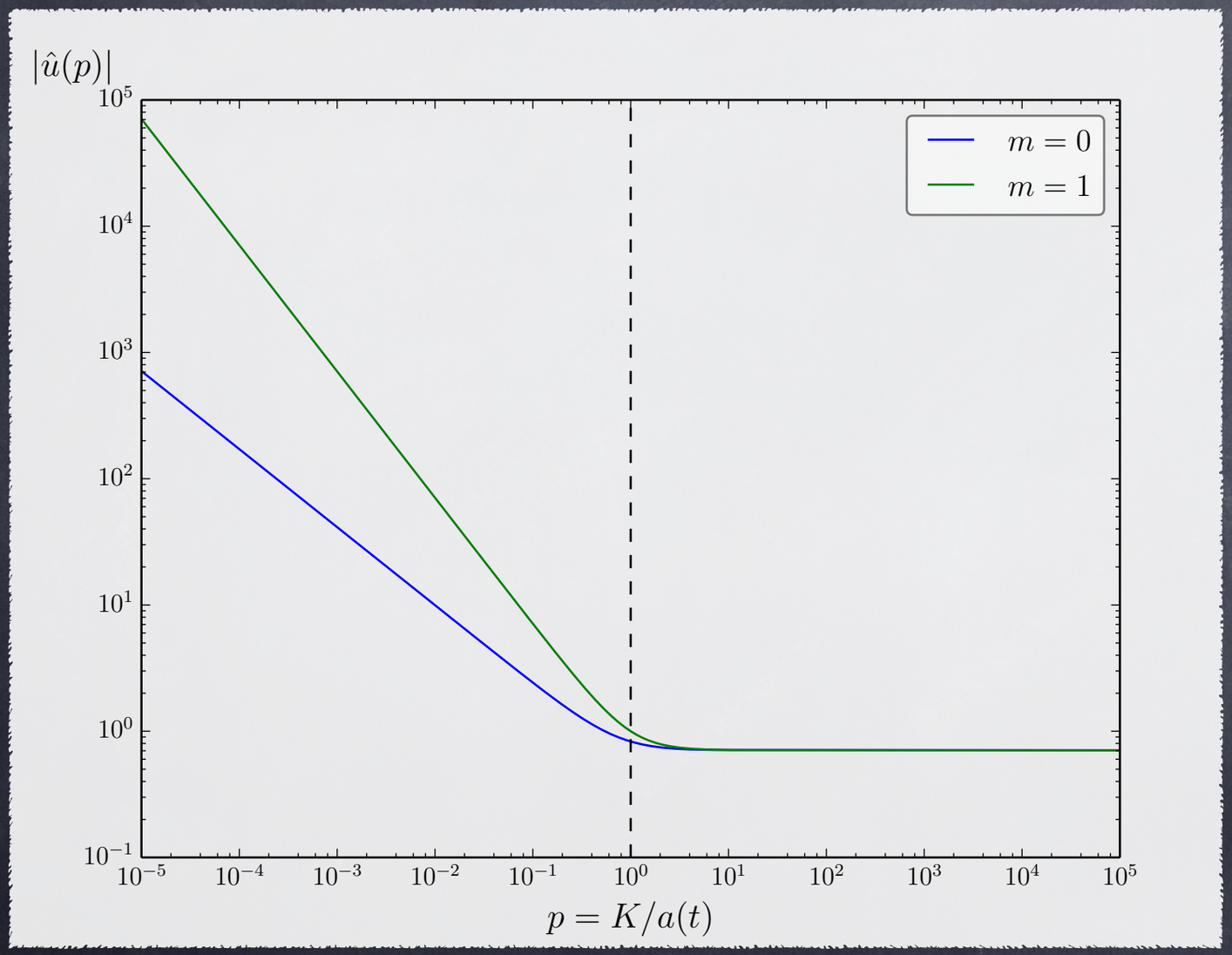
Primordial fluctuations



- Necessity of an inflation era
- Light scalar fields source primordial fluctuations

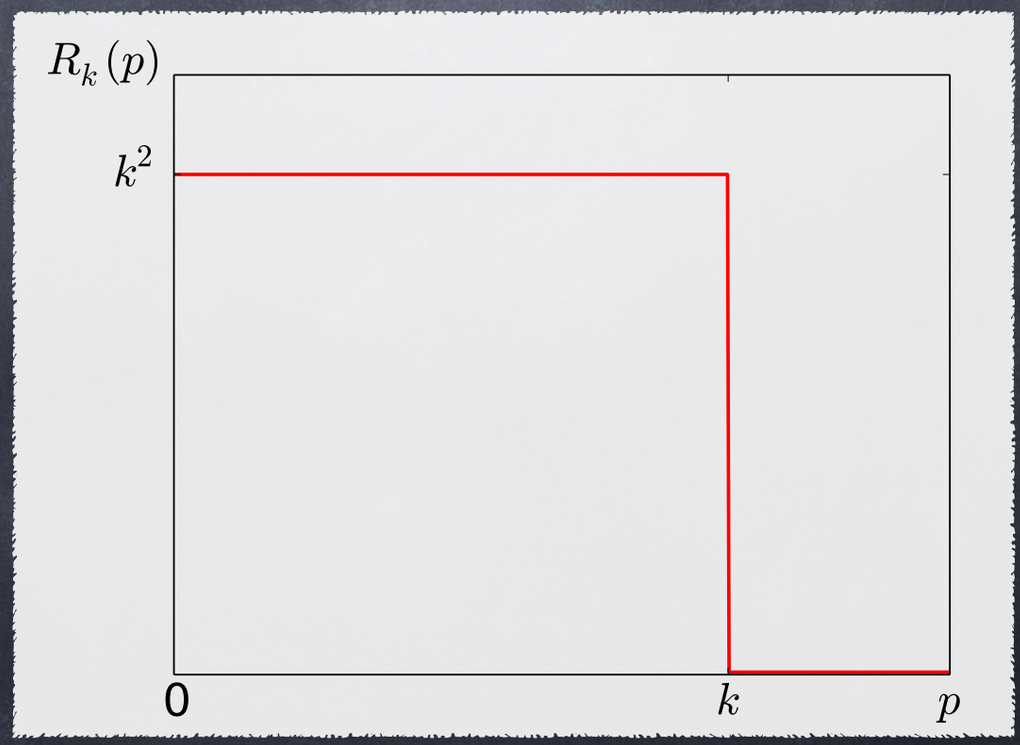
Spectral accumulation in de Sitter space



- Negative power law
- Loop corrections are IR divergent
- Resummation is necessary

Nonperturbative renormalization group

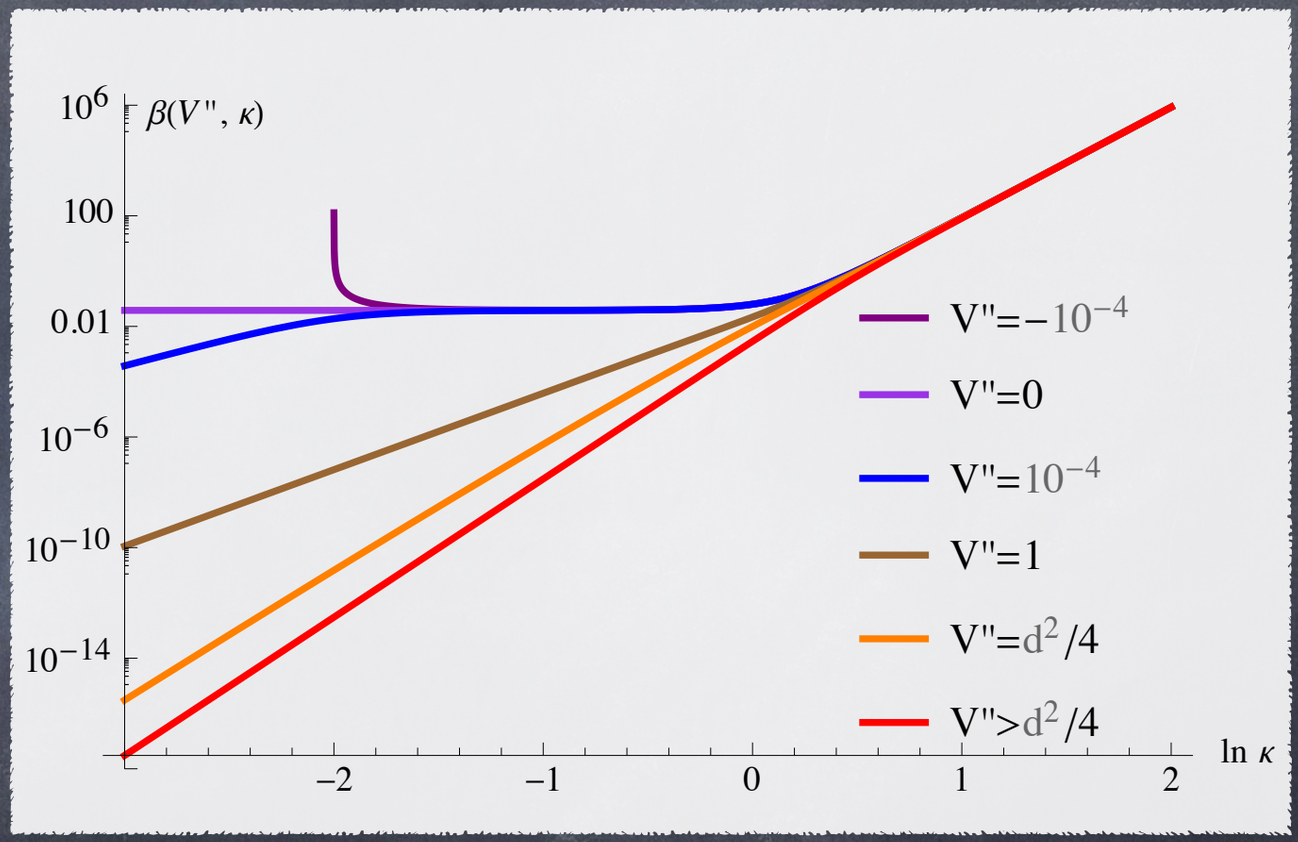
- Mass freezes fluctuations
- Modify the bare theory by adding mass
- Separate regulated and unregulated modes



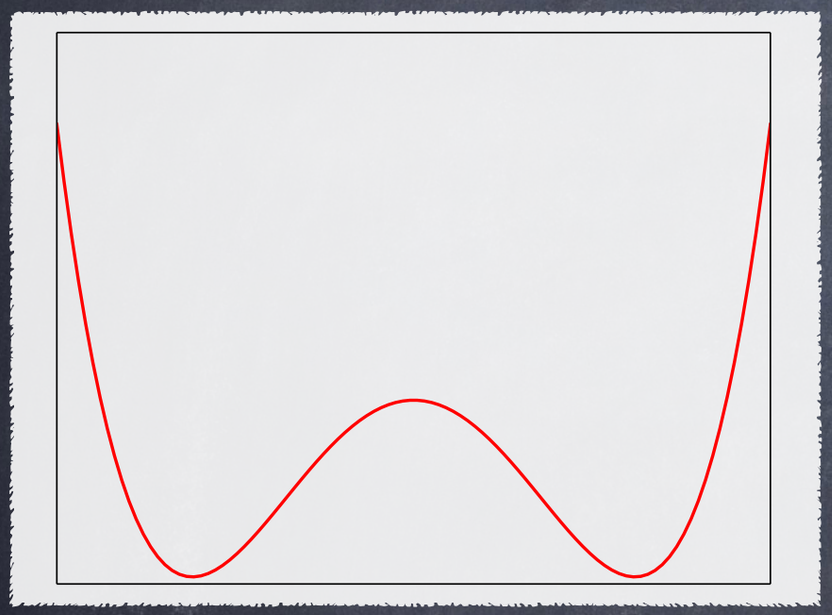
Flow of the effective potential

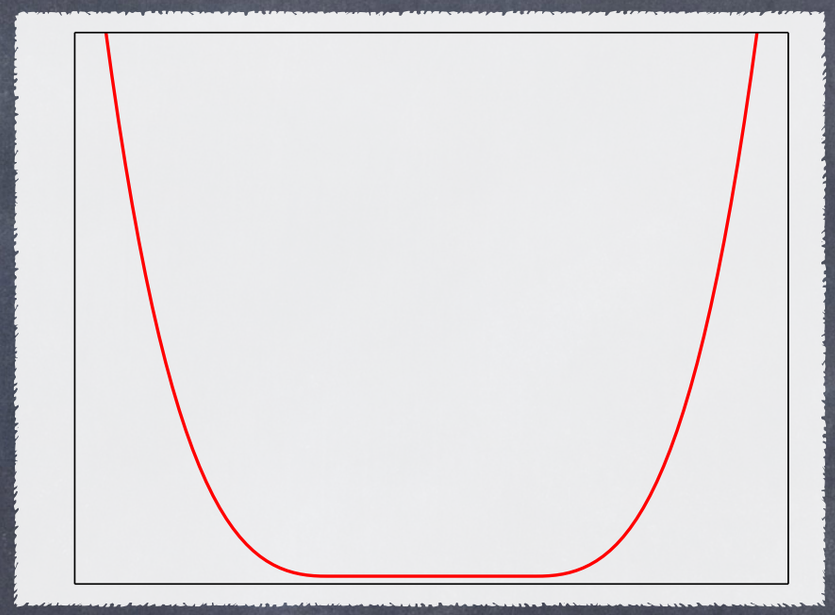
$$\frac{\partial V}{\partial k} = \beta(k, V'')$$

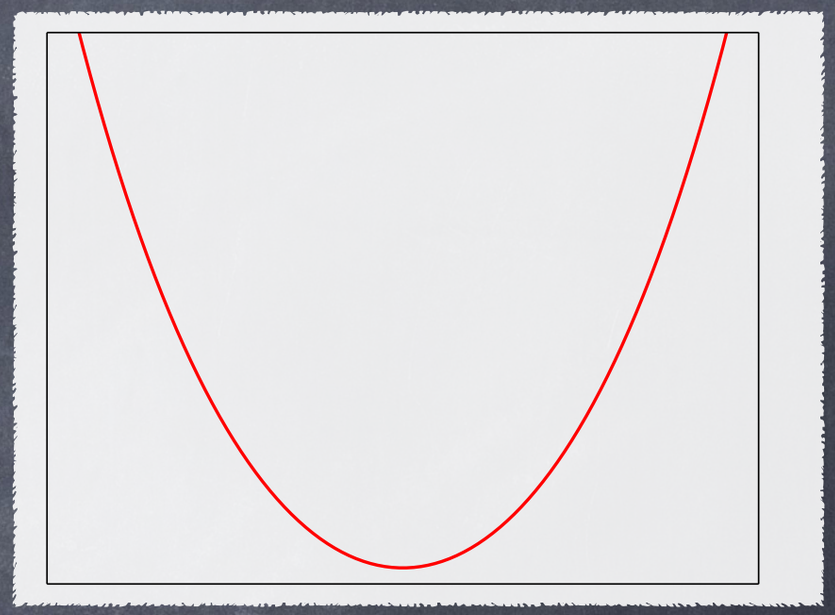
- Convexification of the effective potential
- Effective dimensional reduction



Convexification of the effective

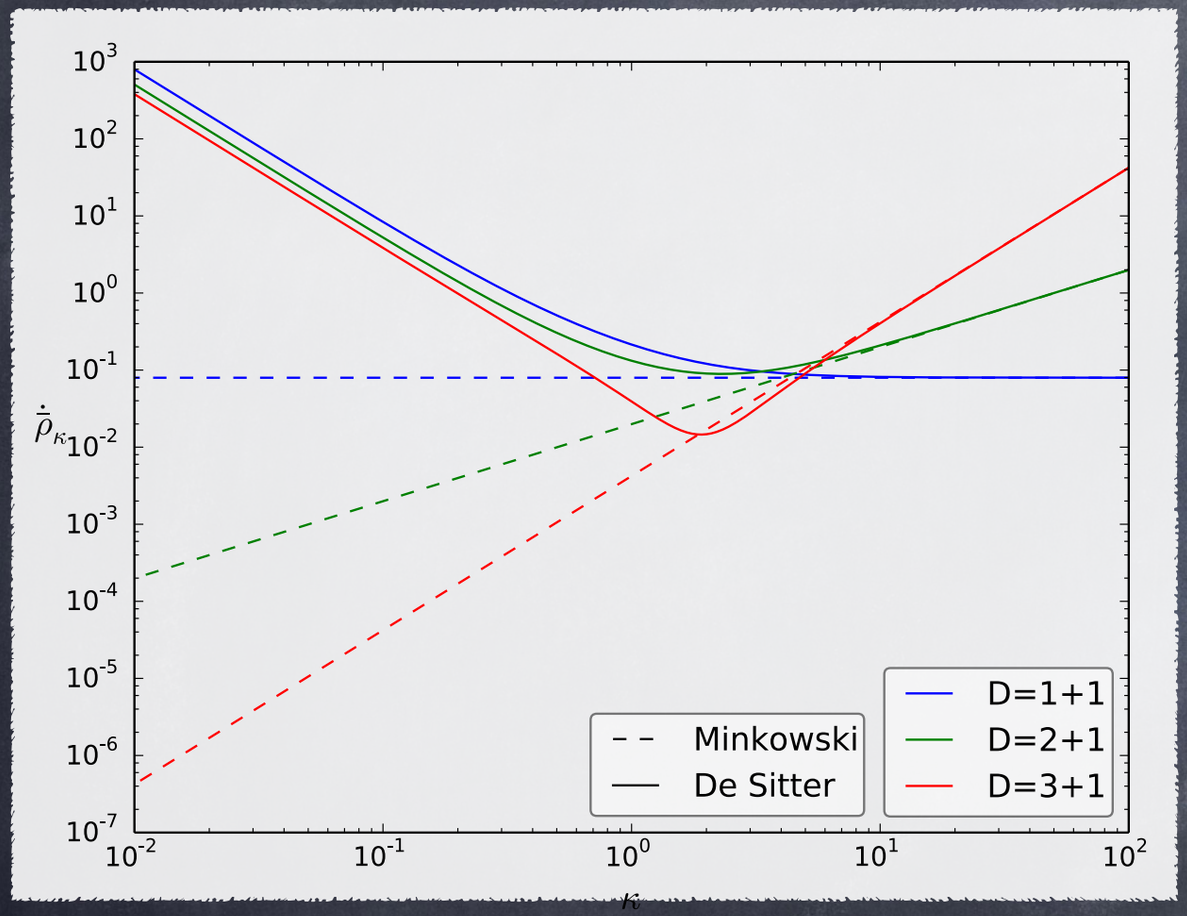


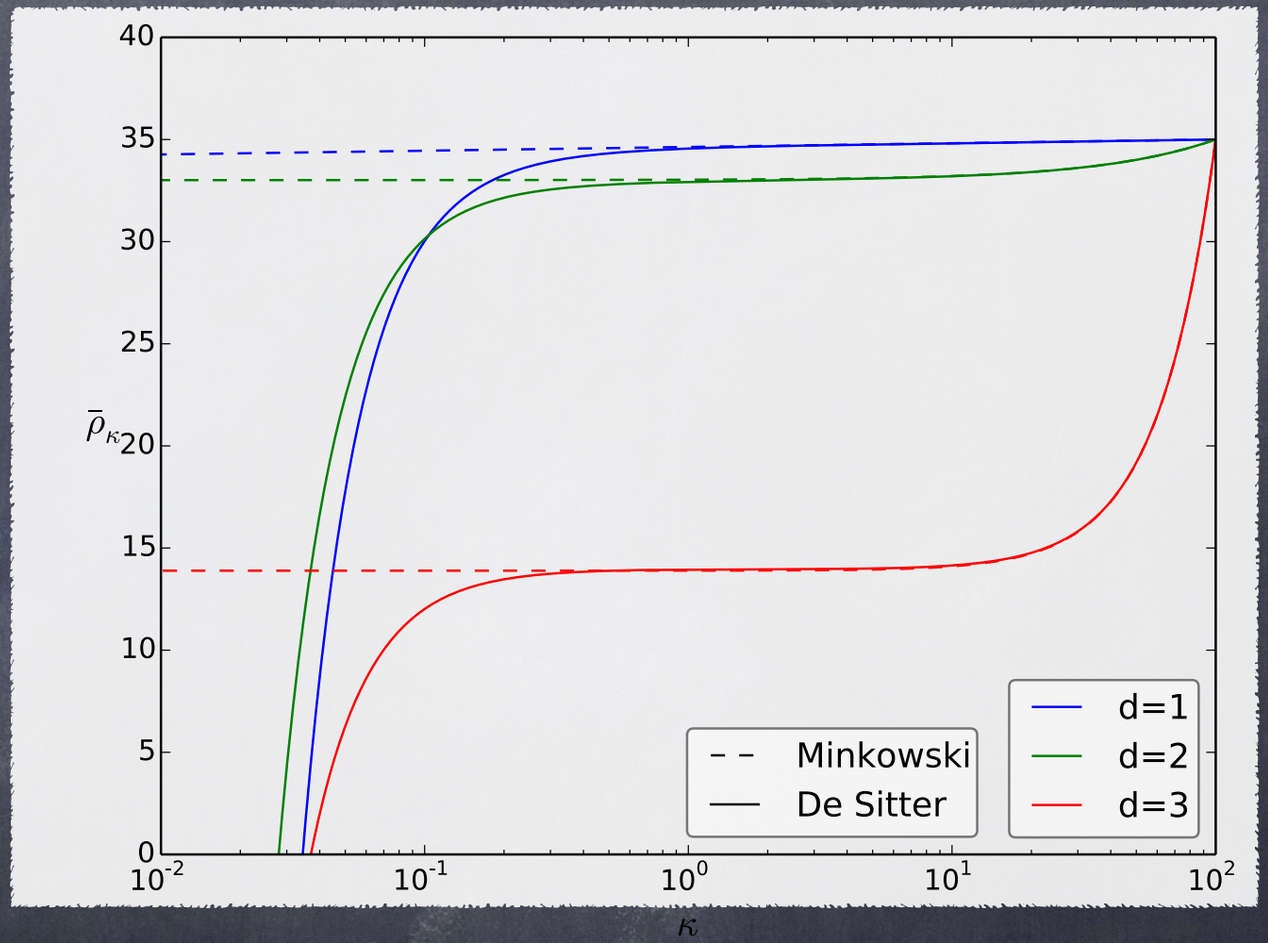




- Restoration of any broken symmetry

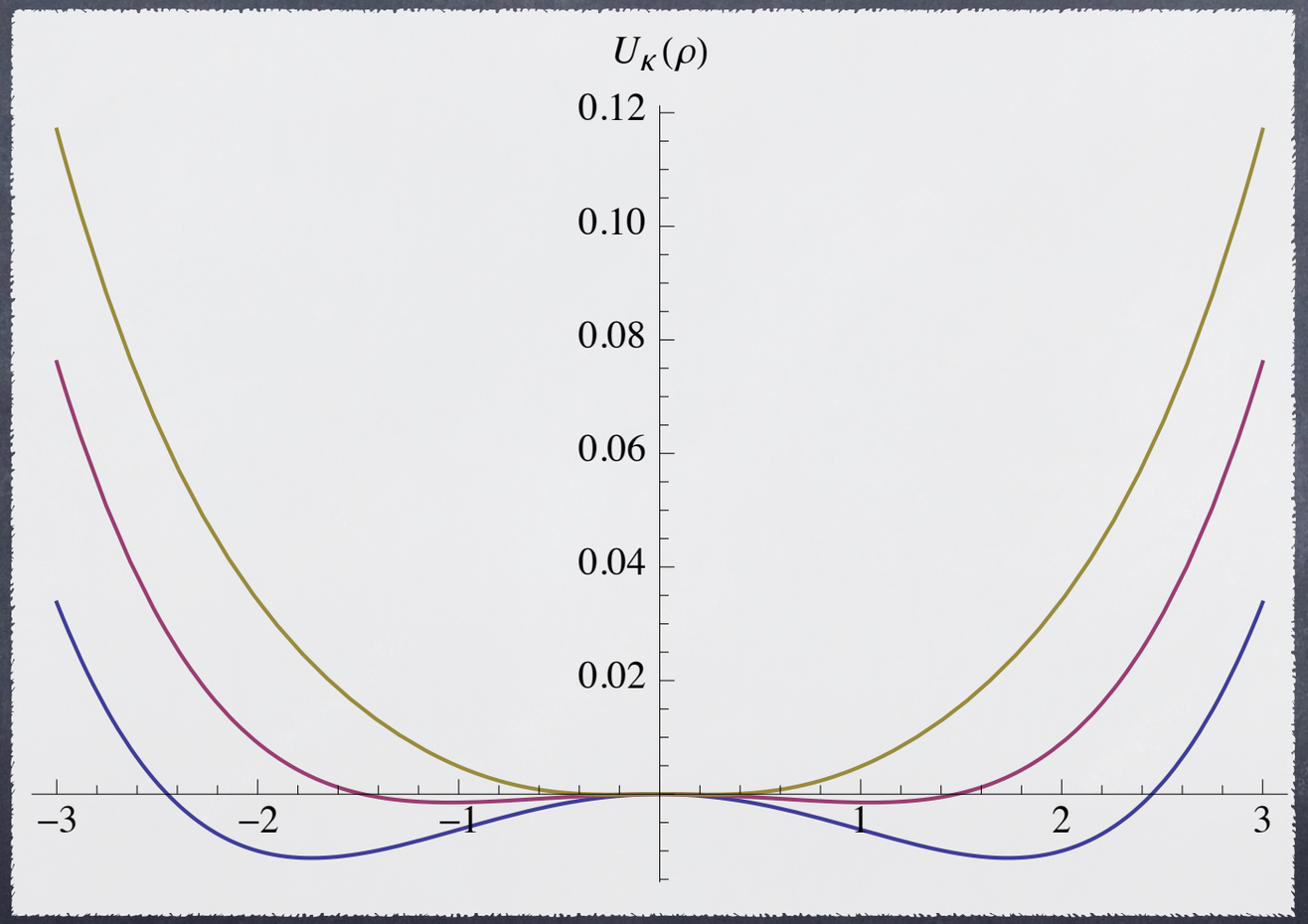
Flow of potential minimum



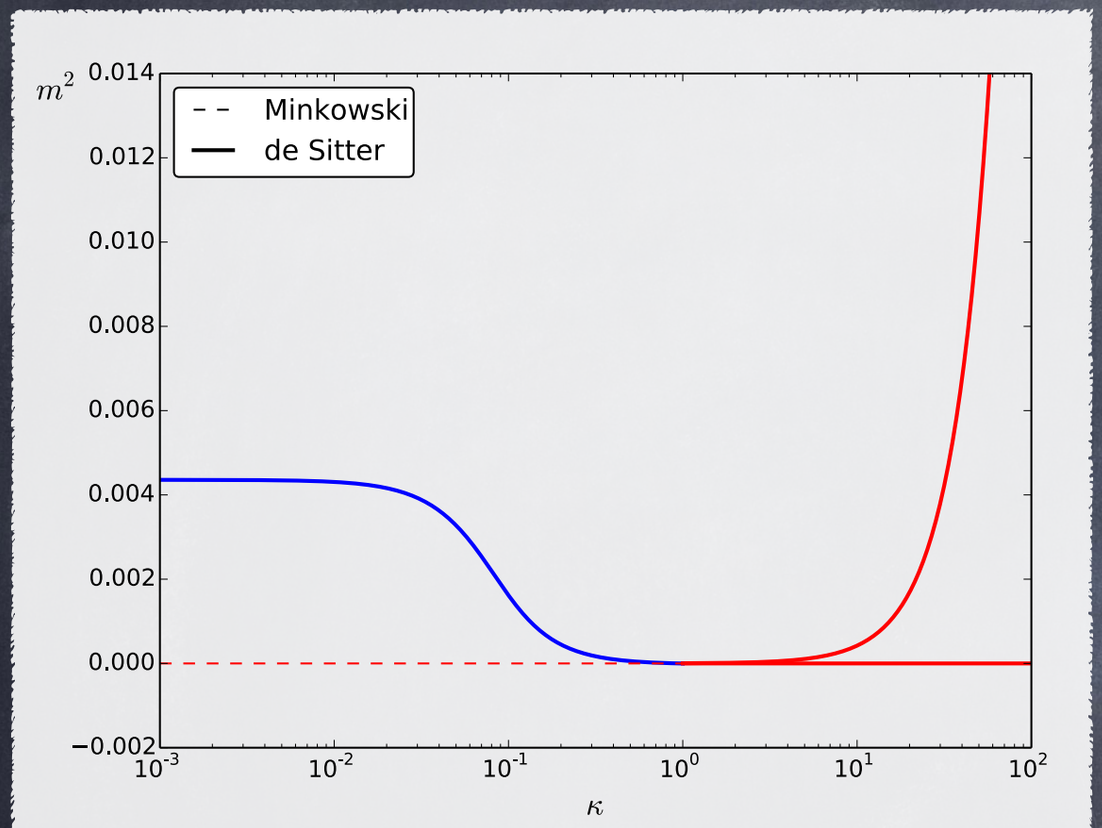


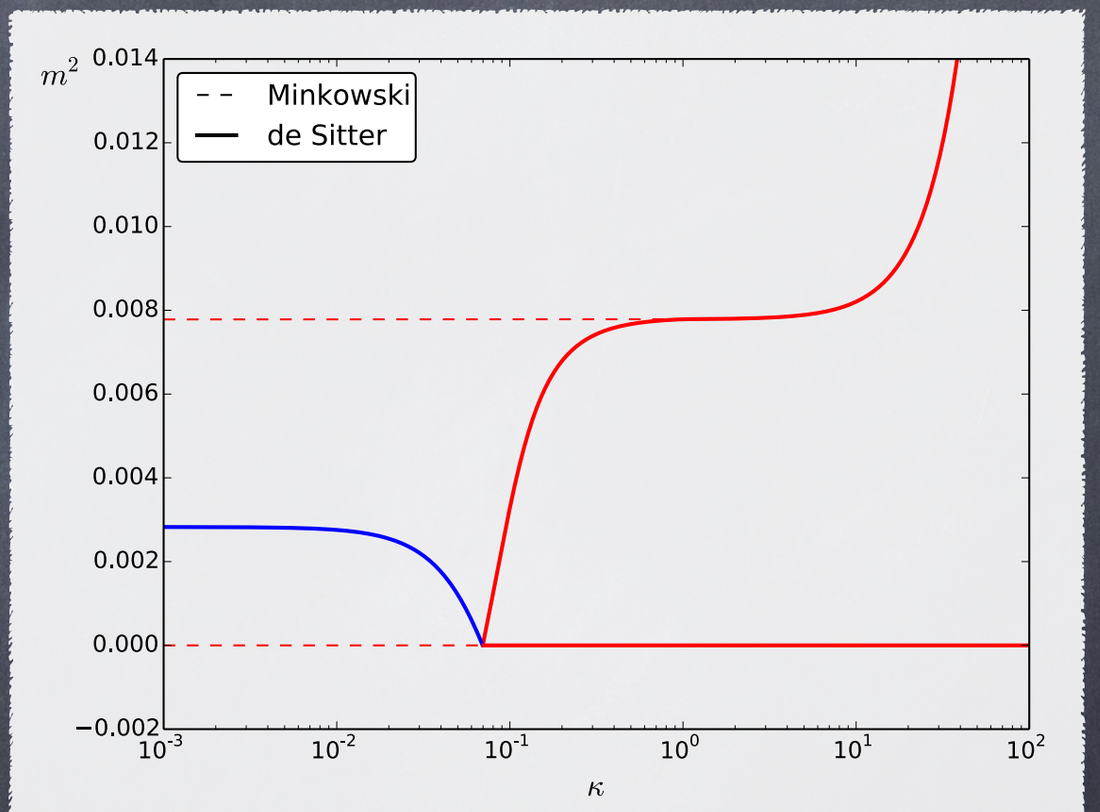
- Behaviour is zero-dimensional
- No broken symmetry is possible

Symmetry restoration



Mass generation





- effective mass $m^2 \propto \sqrt{\lambda}$: non-analytical result

Summary

- Light scalar fields are relevant to inflation
- IR divergences in loop corrections
- resummation : NPRG
- Many interesting results :
  - symmetry restoration
  - effective mass and coupling
- Improvements are possible!

Questions?