Asymptotic Safety for Gravity

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The issue with quantum gravity

- Problem:
  Quantisation of classical general relativity results in a perturbatively **non-renormalisable** QFT

- One possible solution:
  Quantise general relativity in a **non-perturbative manner**

- This proposal involves no new fields or symmetries and the result would be a fundamental theory

Technology to attack the problem

- Path integral difficult $\Rightarrow$ integrate out modes only down to some scale Λ

- Turn path integral into a (functional) differential equation for the action S_Λ describing physics at scale Λ

- What happens for $\Lambda \to \infty$? $\Rightarrow$ **UV fixed point**

In this case we have a well defined QFT!

What it looks like

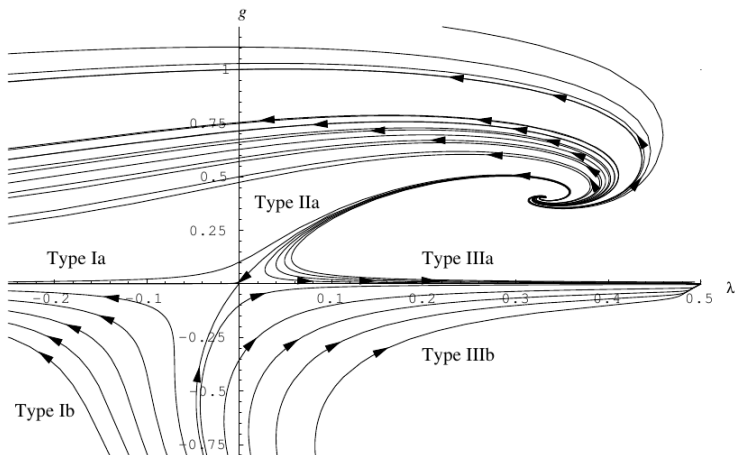**Figure:** Renormalisation group flow for Einstein-Hilbert (M. Reuter, F. Saueressig, 2012)