S18E01 The renormalization group

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1 The Wilsonian renormalization group

1. For each cutoff Λ we have a corresponding effective action S_Λ such that

$$Z = \int D\phi_\Lambda \exp iS_\Lambda = \int D\phi_{\Lambda'} \exp iS_{\Lambda'} = \cdots$$

2. In the effective action if a coupling constant Q_Λ has energy dimension $\dim Q$, then to say whether it is large or small we should consult the more meaningful quantity

$$q_\Lambda \equiv \frac{Q_\Lambda}{\Lambda^{\dim Q}}$$

3. Renormalization group fix points:

$$\{q_{\Lambda'}\} = \{q_\Lambda\} \text{ up to a field rescaling}$$