Analytic continuation of functional renormalization group equations

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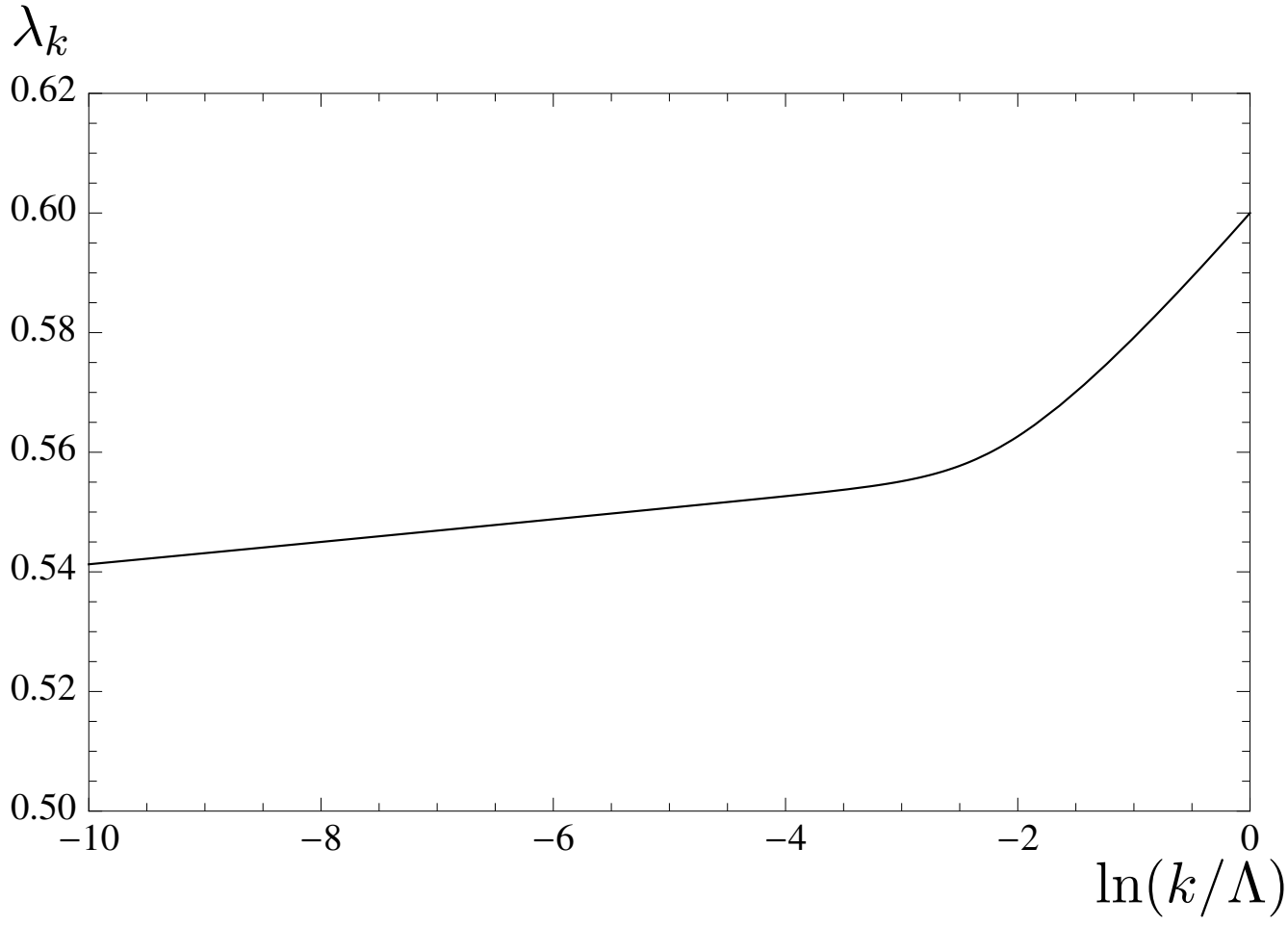
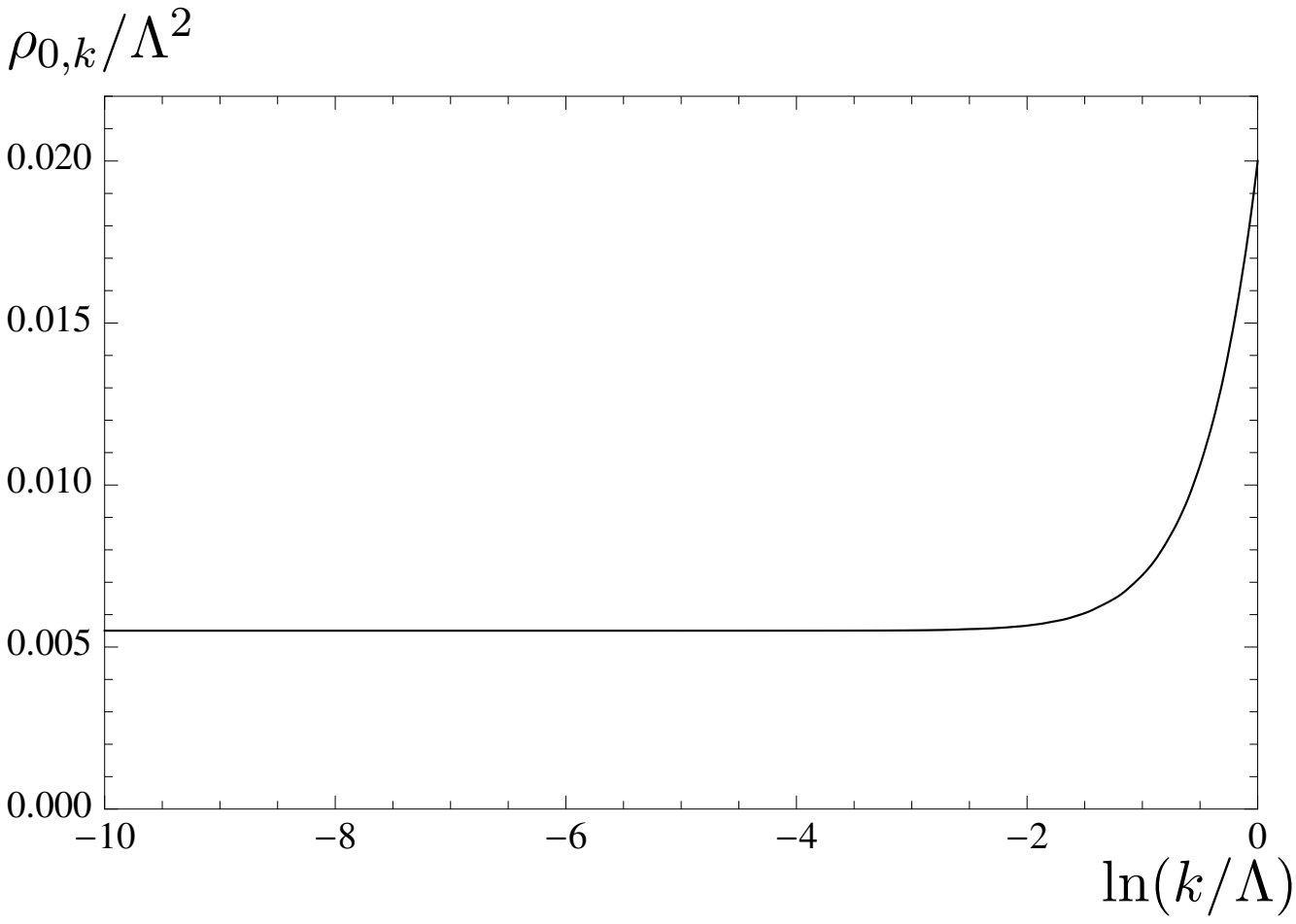
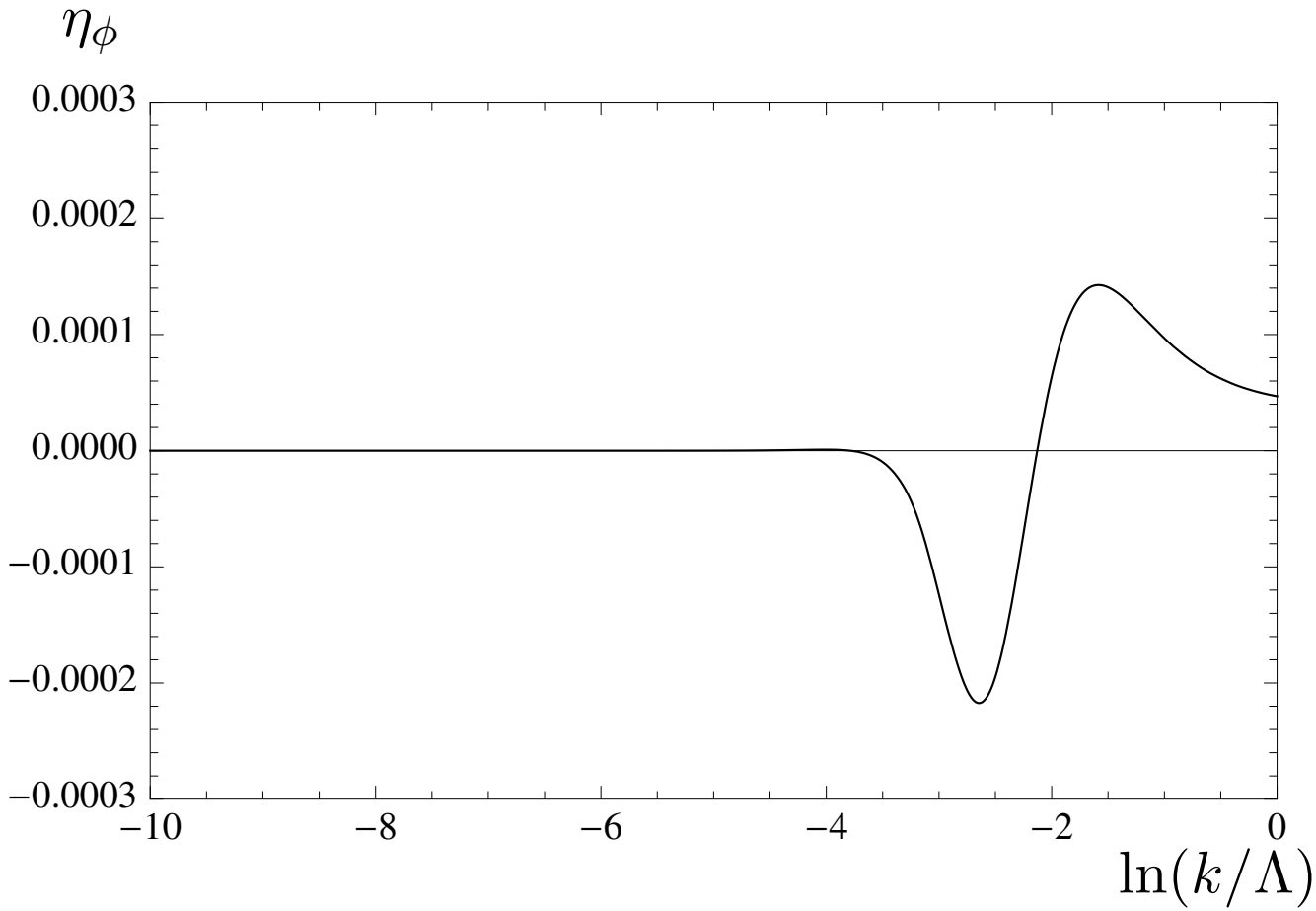
ITP Heidelberg, 10.01.2012



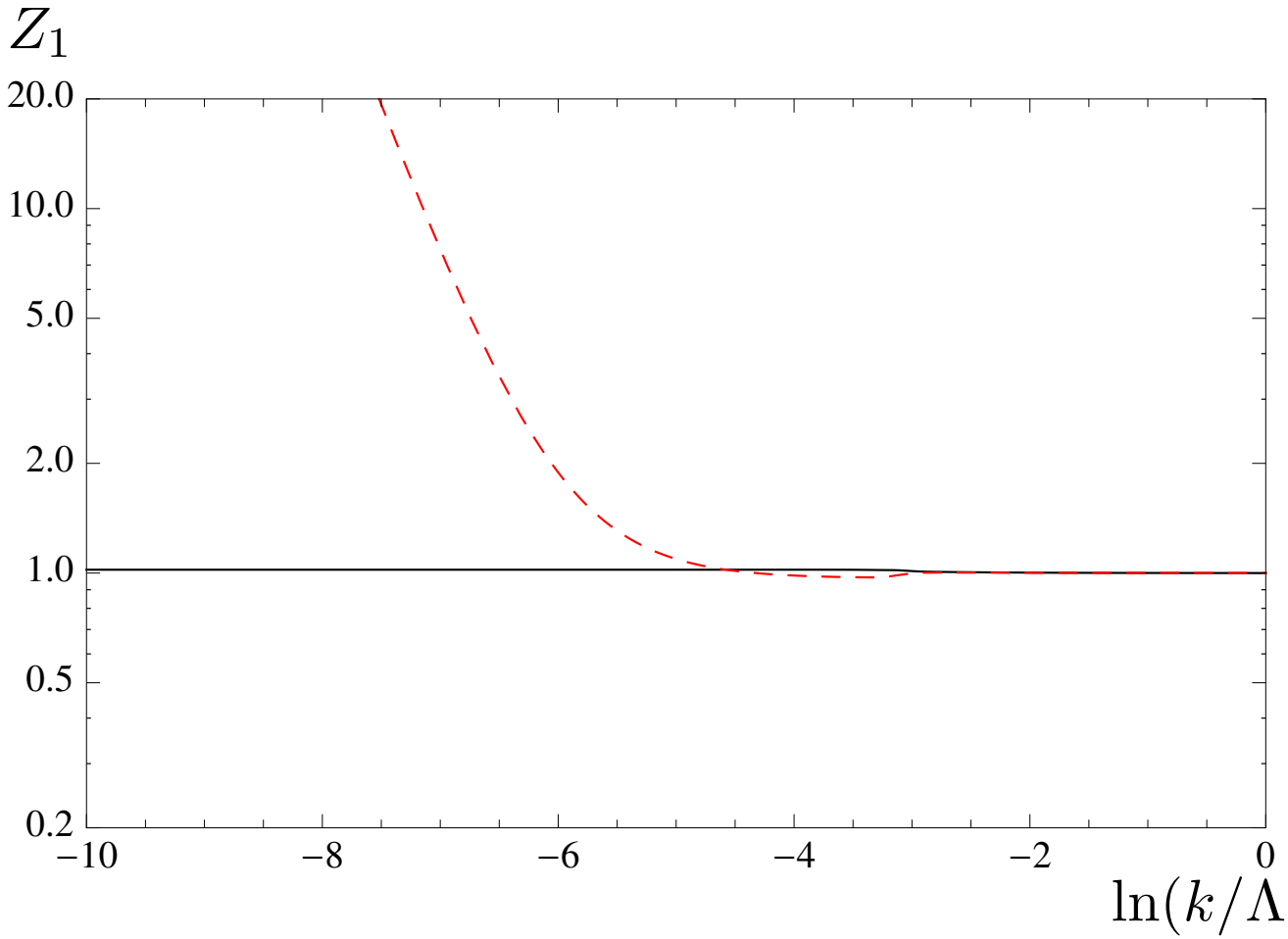
Flow of the interaction strength λ_k.



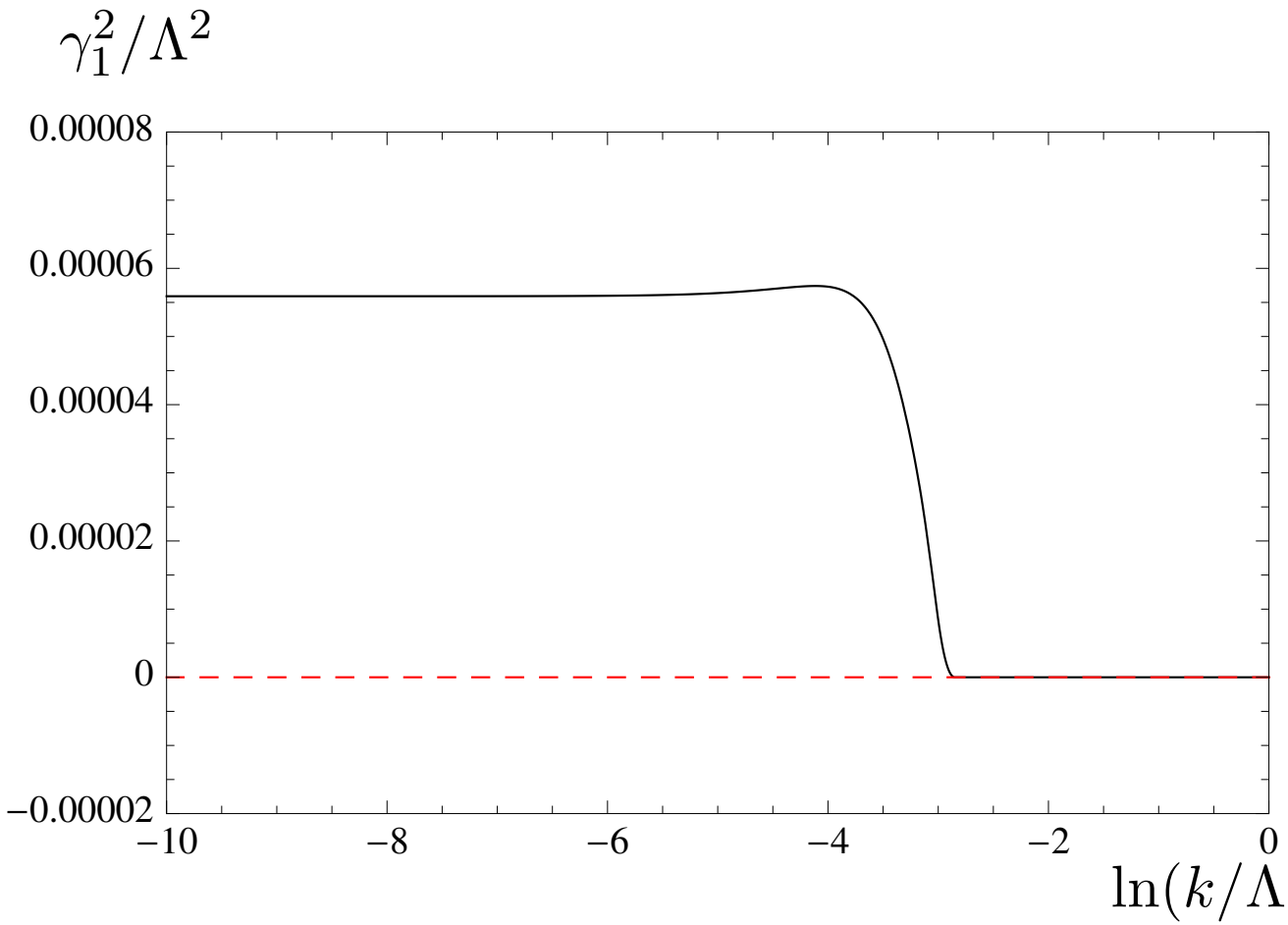
Flow of the minimum of the effective potential $\rho_{0,k}$.



Anomalous dimension η_ϕ.



Flow of the coefficient Z_1 (solid line). We also show the resulting behavior if the flow equation is evaluated at $q_0 = 0$ instead (dashed line). Interestingly, one finds $Z_1 \to \infty$ for $k \to 0$ in the latter case whereas the result is completely regular if the flow equation is evaluated on-shell.



Flow of the discontinuity coefficient γ_1^2 (solid line). We also show the resulting behavior if the flow equation is evaluated at $q_0 = 0$ instead (dashed line). As expected, the discontinuity γ_1^2 is non-zero on-shell whereas it vanishes for $q_0 = 0$.

Conclusions

- Analytic continuation of flow equations works in praxis
- Improved derivative expansion in Minkowski space possible
- Many dynamical and linear response properties can now be calculated from functional renormalization