

QG EFFECTIVE THEORY FOR PRIMORDIAL GRAVITATIONAL WAVES

WORK IN PROGRESS

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HAMILTON

WITH THANKS TO STEFAN HOFMANN
PI

AND RES. CORP.

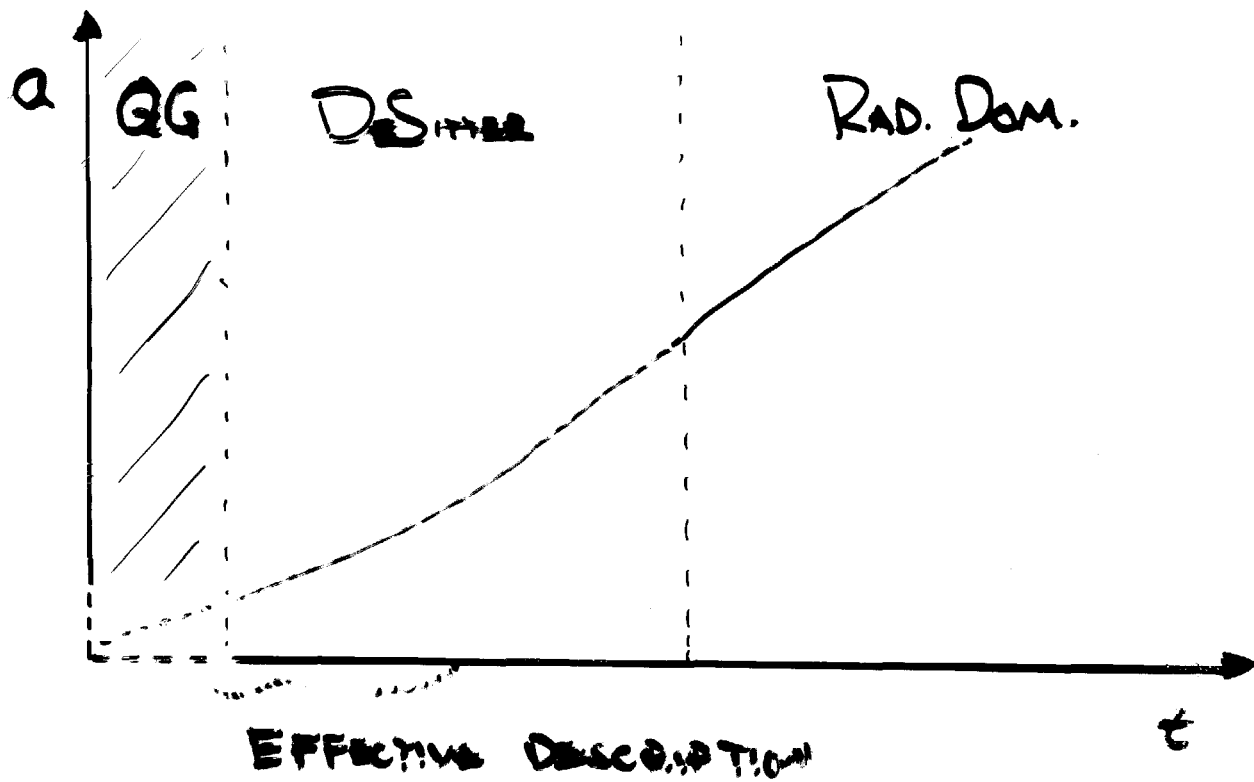
FRAMEWORK: GW BACKGROUND

[B. ALLEN PRD 37 (1987) 2078

A. BUONANNI gr-qc/0303085

* CONFORMAL
VS.
COSMIC TIME

TWO ERA COSMOLOGY MODEL



METRIC PERTURBATIONS

$$h_{ab} \sim \underline{h_k(t)} e_{ab}(k) e^{ik \cdot x}$$

E'S EQUATIONS

$$\ddot{h}_k + 3 \frac{\dot{a}}{a} \dot{h}_k + \frac{k^2}{a^2} h_k = 0$$

• LOOPY QUANTUM COSMOLOGY

IDEA: SCALE FACTOR, AND INVERSE SCALE FACTOR, SHOULD BE REPLACED BY THE EXPECTATION VALUES IN COSMOLOGICAL BACKGROUND.

NOTE: $\frac{1}{\langle a \rangle} \neq \langle \frac{1}{a} \rangle$ *

QUANTIZATION STEPS

- USE HAMILTONIAN FRAMEWORK FOR QG BACKGROUND AND METRIC PERTURBATIONS.
 $\langle H(h_k, \pi_a) \rangle$
- SPLIT QUANTIZATION OF 'BACKGROUND' AND 'PERTURBATION' \hookrightarrow QFT CURVED SPACE
- FIND LEADING ORDER CORRECTIONS DUE TO *.
- MODIFY EOM \rightsquigarrow EFFECTIVE THEORY FOR h_k

$$\ddot{h}_k + \frac{3\dot{a}}{a} \dot{h}_k + \frac{k^2}{a^2} \left(1 + \frac{2\epsilon f p^m}{a^m} \right) h_k = 0$$

- FIND SPECTRUM

• PRELIMINARY RESULTS :

- DEPEND ON QUANTIZATION OF $\frac{1}{a}$.

<u>MODEL.</u>		<u>ORDER M.</u>	$\frac{\epsilon}{\sqrt{2\pi}}$	
- HUSAN - WUKER	ASYMMETRIC	1		
	SYMMETRIC	2	$2^{j+1}/12^j$	$j \in \mathbb{Z}$
- LQC		4	$5/1728$	ANS. TO DO