

A GENERALISATION of the BLACK HOLE'S AREA THEOREM

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14th NOVEMBER 2023



UNIVERSITEIT
VAN AMSTERDAM

THE TENSION

HAWKING 171



Area of
BH can
ONLY
INCREASE

- CAUSALITY CONDITION
- $T_{\mu\nu}U^\mu U^\nu \geq 0$

CLASSICAL
CONDITION!

HAWKING 174



BHs will
eventually
EVAPORATE



SEMICLASSICAL
GRAVITY REGIME

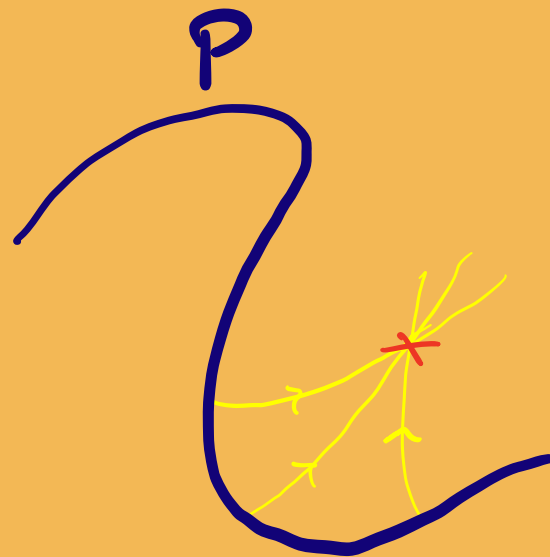
Will fail for any Quantized
Field Theory



FOCAL POINTS

KEY of THE PROOF

EXISTENCE CRITERIA for focal points



"HAWKING"

Raychaudhuri's Equation

$$\frac{D\theta}{D\lambda} - \underbrace{R_{\mu\nu}U^\mu U^\nu}_{\geq 0}$$

NEED POINTWISE CONSTRAINT

"O'NEILL"

Index Form Method

$$\int_0^e \{ |g'(x)|^2 + \underbrace{\int^2 R_{\mu\nu}U^\mu U^\nu}_{\geq 0} \} d\lambda \leq U^\mu H_{\mu\nu} U^\nu$$

"CAN" USE INTEGRATED CONSTRAINT

RESULTS

"HAWKING"

$$\frac{S_{\text{Ave}}}{A_{\text{ve}}} \gg 0$$



TOY MODEL

$$\frac{S_{\text{Ave}}}{A_{\text{ve}}} \gg -\dot{V} \sim T_H^3$$

$$\dot{V}_{\text{EV}} = -\frac{1}{M} \frac{dM}{dt} \sim T_H^3$$

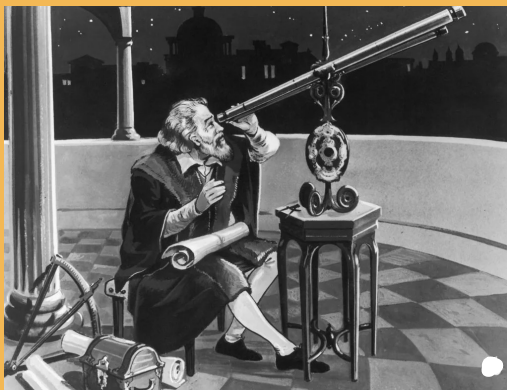


- * CLASSICAL ENERGY CONDITION
- * EVAPORATION ALLOWED
- * LOCATION of TRAPPED SURFACE

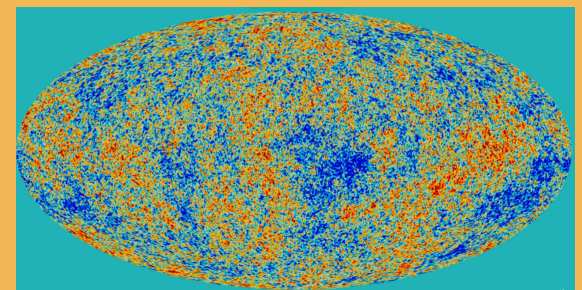


COSMOLOGICAL CORRELATORS

with Victor Gorbenko EPFL



JAMES WEBB DEEP FIELD



COSMIC MICROWAVE BACKGROUND

A WINDOW INTO QUANTUM GRAVITY

QUANTUM
FLUCTUATIONS

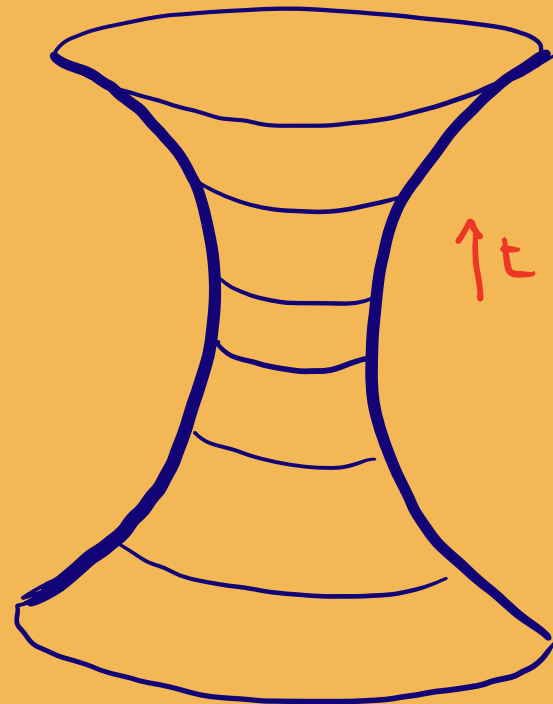
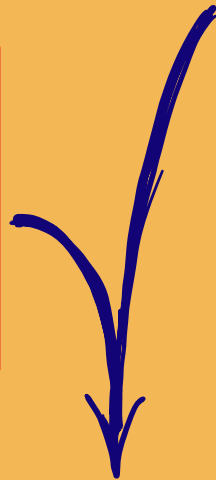


QUANTUM FIELD
THEORY

COSMOLOGICAL
INFLATION



de SITTER SPACE



Thank you for your

attention!