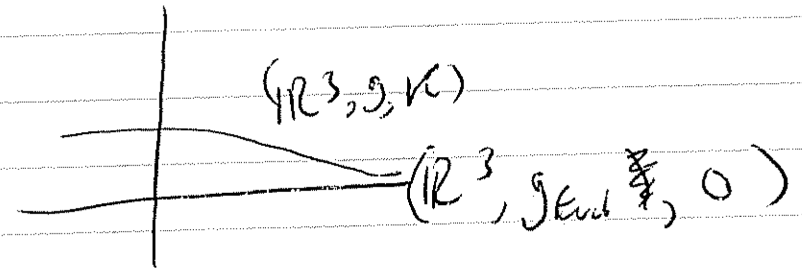
11 May 2007
M. Anderson

Is AdS spacetime dynamically stable?

Minkowski: $g = -dt^2 + \sum dx_i^2$

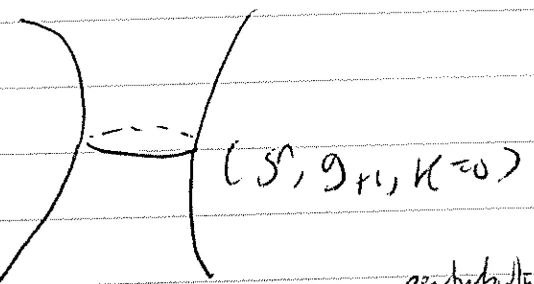
$Ric \equiv 0$



Christodoulou - Klainerman: Lindblad - Rodnianski all dimension OK

de Sitter $\quad \Lambda > 0 \qquad$ Scalar > 0

$g^{n+1} = -dt^2 + \cosh^2 t \, g_{S^n(1)}$



$Ric_g = n g$

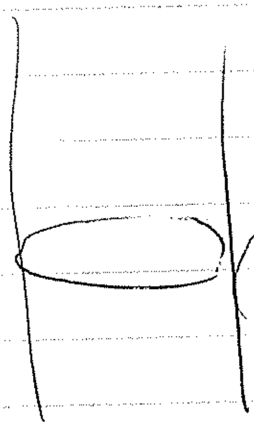
perturbation (S^n, g, K)

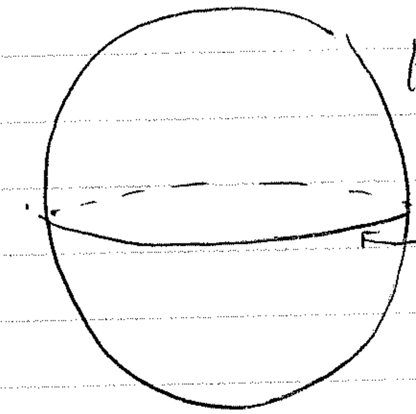
3+1: Friedrich
n+1 even: Anderson (2004)
all n: Ringstrom (2006)

$\Delta u = 0$, $u|_{\partial} = f$, $N(g)$.

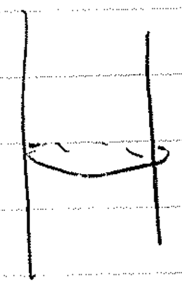
Anti de Sitter $\Lambda < 0$ $\qquad Ric_g = -n\, g$

$$g_{AdS} = -\cosh^2 r\, dt^2 + \underbrace{dr^2 + \sinh^2 r\, g_{S^{n-1}(1)}}_{H^n(-1)}$$

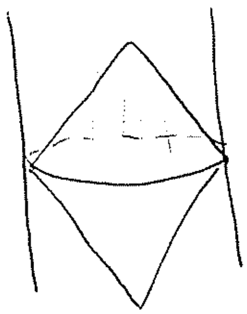




Conformal compactify



$$\tilde{g}_{AdS} = \frac{1}{\cosh^2 r}\, g_{AdS}$$



Initial boundary value problem

Q Let (B^n, g, K) be a small perturbation of pure AdS initial data with boundary data = Einstein cylinder.

Does this generate a global solution?

Wald - Ishibashi

Linear stability : linearized solutions to Einstein equations (normalized modes) in $L^2(\Sigma)$.

(∞-dim'l space)

These solutions are global + oscillatory — no decay or dispersion.

Theorem If (M, g) complete Riemannian Einstein, conformally compact then any Killing field on $(\partial M, \gamma)$ extends to a Killing field on (M, g).

Kerr