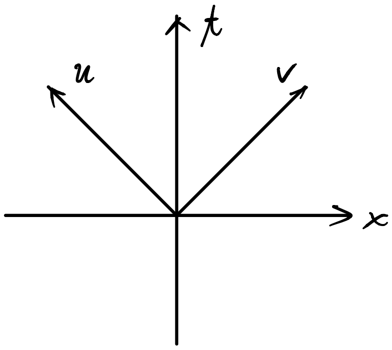
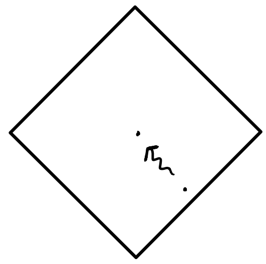
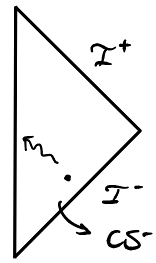
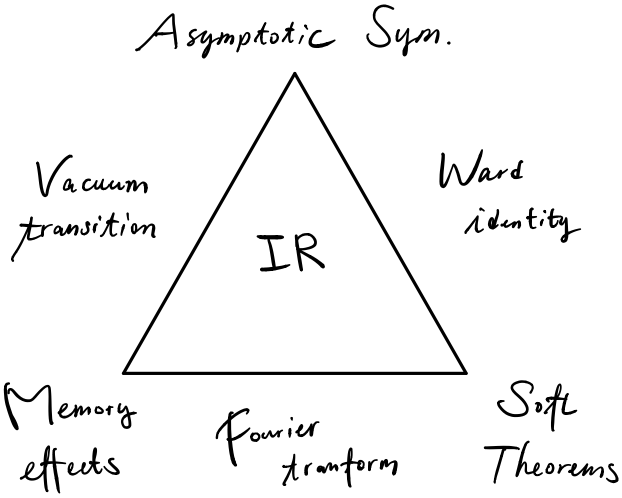


Conformal compactification

$u \to \tan u$
$v \to \tan v$







↓ Examples

Symmetries

Grav. displacements ~ Super translations
at $\to \infty$
at $\to$ horizon → The "soft hair" proposal
e.g. 1810.01847

Black hole

Electric / color / ... "Large" gauge symmetries

ASG ($\sim$ flat$_4$)

Poincaré	$\underbrace{CS^+ \times \mathbb{R}}^{\mathcal{I}^+} \longmapsto$	$\mathbb{C}^2 \ni (z, \bar{z})$
$SO(3)$ rotations	rotations, $\mathbb{1}$	global $SL(2,\mathbb{C})/\mathbb{Z}_2 \simeq SO(3,1)$
boost (along p^μ, think of little group)	$\mathbb{1}$, dilations	$(Y^z(z), Y^{\bar{z}}(\bar{z}))$
translations u	$l=0$, dilation, $*$	$\epsilon \sim$ const.
translations spatial	$l=1$, rotations, $*$	$\underbrace{{}^1\text{rotation} + {}^2\text{translations}}_{\text{Another global } SL(2,\mathbb{C})}$

$\downarrow$

Super-trans $\sim$ Vir generators, $\epsilon(z,\bar{z})$

———— BMS^+ so far

rotation + boost

$\rightsquigarrow$ Superrotations $\underline{\text{local}}$ Vir' generators $(Y^z(z), Y^{\bar{z}}(\bar{z}))$