(0.1) **The Boulware state**
$|B\rangle$ retarded propagator is given by

$$E^{+}_{\mathrm{B}}(x,x') = \mathbb{i}\sum_{lm}\int_{0}^{+\infty}\frac{\mathbb{d}\omega}{4\mathbb{\pi}\omega}\mathbb{e}^{-\mathbb{i}\omega(t-t')}Y_{lm}(\theta,\phi){Y_{lm}}^{*}(\theta',\phi') \cdot (R^{\rightarrow}_{l}(\omega|r)R^{\rightarrow *}_{l}(\omega|r') + R^{\leftarrow}_{l}(\omega|r)R^{\leftarrow *}_{l}(\omega|r')) \tag{0.1}$$

$$E^{+}_{\mathrm{H}}(x,x') = \mathbb{i}\sum_{lm}\int_{-\infty}^{+\infty}\frac{\mathbb{d}\omega}{4\mathbb{\pi}\omega} \cdot\left(\mathbb{e}^{-\mathbb{i}\omega(t-t')}Y_{lm}(\theta,\phi){Y_{lm}}^{*}(\theta',\phi')\frac{R^{\rightarrow}_{l}(\omega|r)R^{\rightarrow *}_{l}(\omega|r')}{1-\mathbb{e}^{-2\mathbb{\pi}\omega/\kappa}} + \mathbb{e}^{+\mathbb{i}\omega(t-t')}{Y_{lm}}^{*}(\theta,\phi)Y_{lm}(\theta',\phi')\frac{R^{\leftarrow *}_{l}(\omega|r)R^{\leftarrow}_{l}(\omega|r')}{\mathbb{e}^{+2\mathbb{\pi}\omega/\kappa}-1}\right) \tag{0.2}$$

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