Examples:

2-d euclidean space \((E^2)\):
\[
 ds^2 = dx^2 + dy^2 = dr^2 + r^2 d\theta^2
\]

2-d minkowsky space \((M^2)\):
\[
 ds^2 = -dt^2 + dx^2 = -t^2 d\eta + d\lambda^2
\]

\(\bar{\gamma} = \partial_x = x \partial_t + t \partial_x\) Killing vector.
\(u^a = \partial_x\) is a constant
(see that it can't be called properly momentum or energy)

Schwarzschild BH:
\[
 ds^2 = -(1 - \frac{2m}{r}) dt^2 + \left(1 - \frac{2m}{r}\right)^{-1} dr^2 + r^2 d\Omega^2
\]

\(r > 2m\) is a K.V.
\[
 ||dx||^2 = g_{tt} = -(1 - \frac{2m}{r})
\]

In G.M. \(||dx||^2 > 0\) (spacelike) allows states with negative energy \(\rightarrow\) Hawking radiation

Penrose Process:
rotating blackholes \(\rightarrow\) classical negative energy.

\(E_1, (\text{in Boyer-Lindquist cords})\) \(\bar{\gamma}t\) is spacelike with ergoregion
\(E - \delta^2 U a\).
Extract rotational energy from \(\bar{\gamma}t\).

Arrange for \(E_2\) to have a negative value \(\rightarrow E_0 = E_1 + E_2\), \(E_2 < 0 \rightarrow E > E_0\)