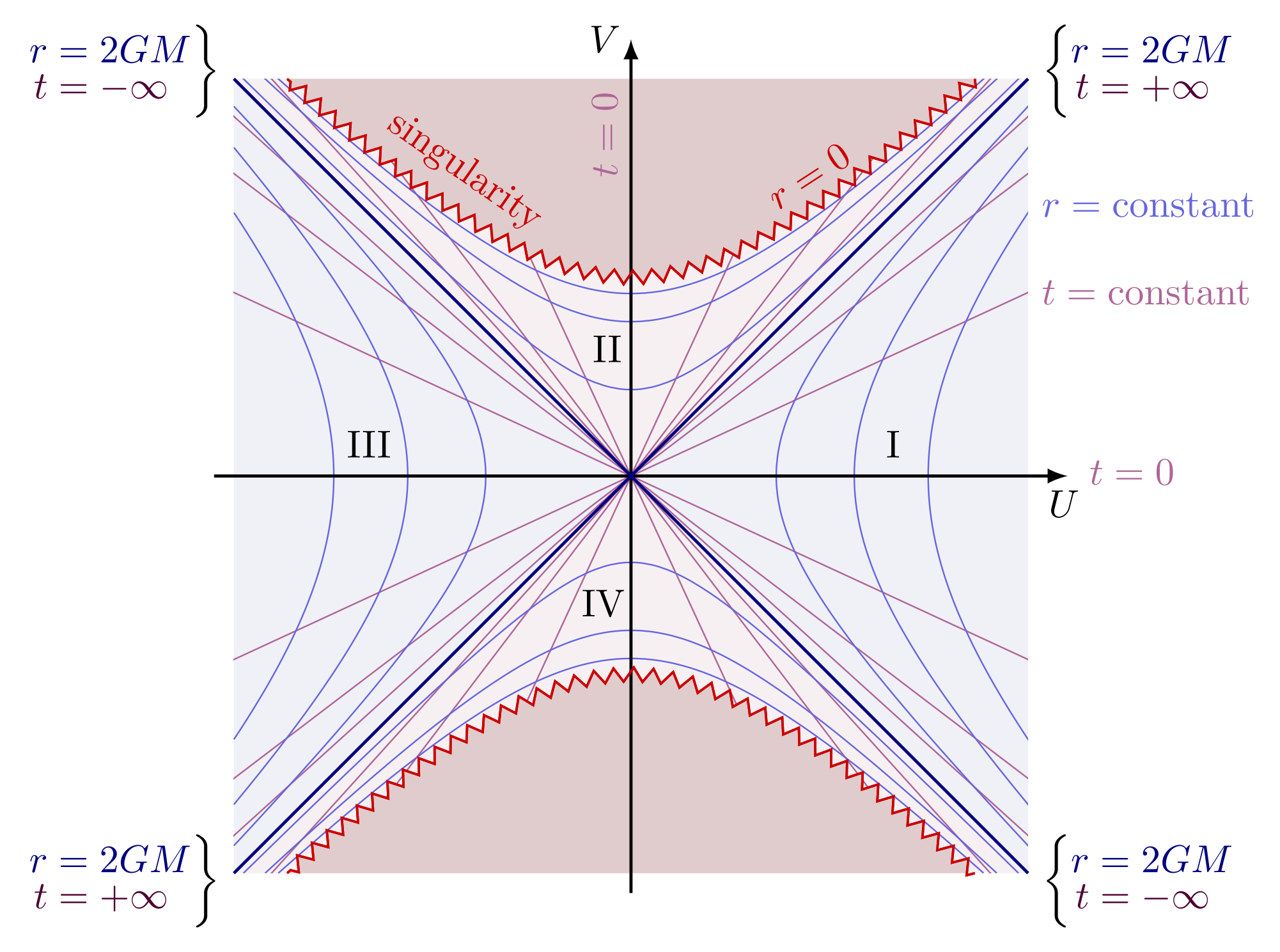
Kruskal-Szekeres coordinates for Schwarzschild spacetime

$$\left.\begin{aligned} U &= \sqrt{\frac{r}{2GM} - 1}\, e^{\frac{r}{4GM}} \cosh\left(\frac{t}{4GM}\right) \\ V &= \sqrt{\frac{r}{2GM} - 1}\, e^{\frac{r}{4GM}} \sinh\left(\frac{t}{4GM}\right) \end{aligned}\right\} \quad \text{for } r > 2GM$$

$$\left.\begin{aligned} U &= \sqrt{1 - \frac{r}{2GM}}\, e^{\frac{r}{4GM}} \sinh\left(\frac{t}{4GM}\right) \\ V &= \sqrt{1 - \frac{r}{2GM}}\, e^{\frac{r}{4GM}} \cosh\left(\frac{t}{4GM}\right) \end{aligned}\right\} \quad \text{for } r < 2GM$$

$$\Rightarrow \begin{cases} U^2 - V^2 = \left(\frac{r}{2GM} - 1\right) e^{\frac{r}{2GM}} & \\ V = \tanh\left(\frac{t}{4GM}\right) U & \text{for } r > 2GM \\ V = \coth\left(\frac{t}{4GM}\right) U & \text{for } r < 2GM \end{cases}$$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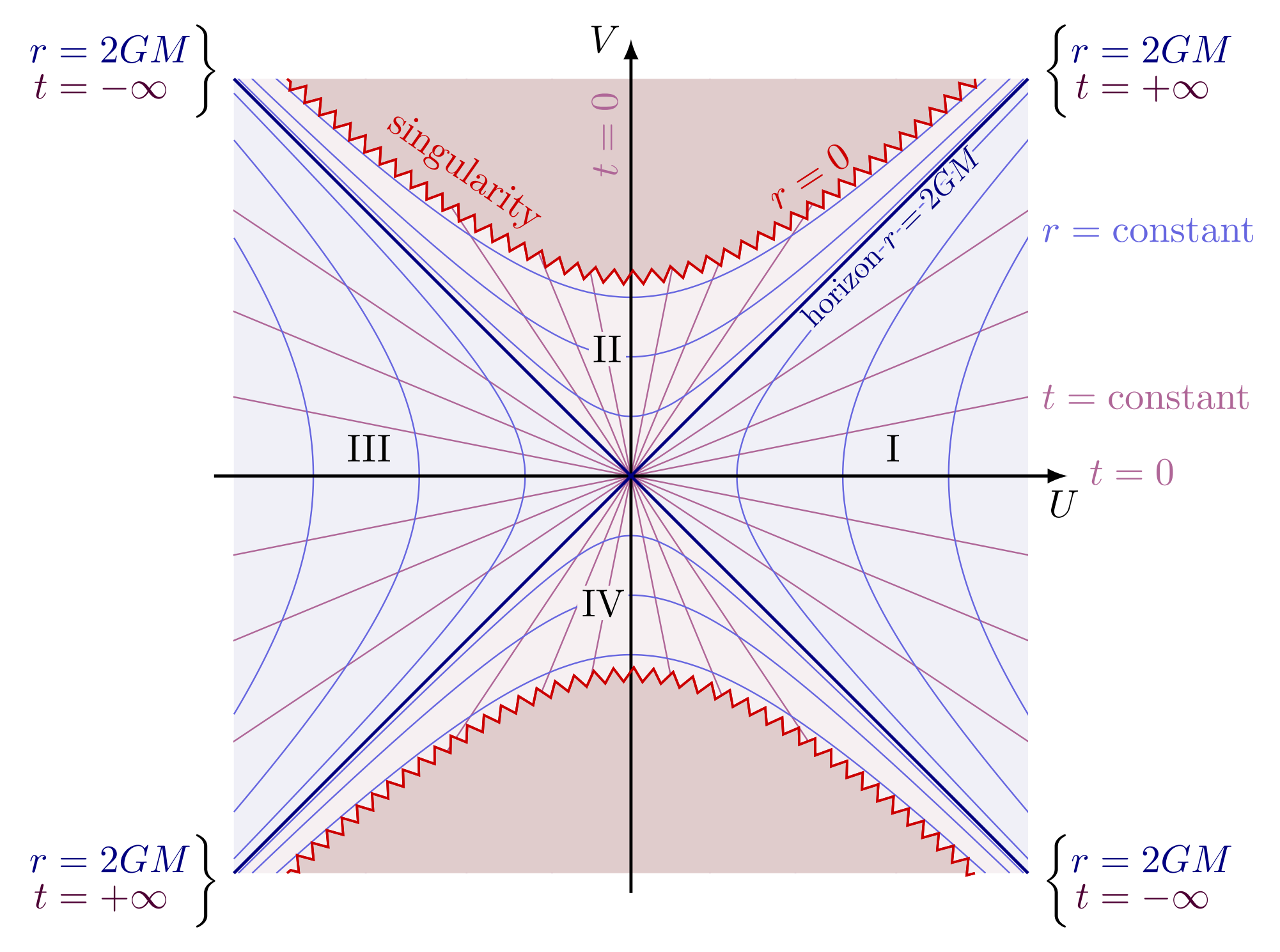
$t = -\infty$
V
$t = 0$
singularity
$r = 0$
$r = 2GM$
$t = +\infty$
r = constant
t = constant
II
III
I
IV
$t = 0$
U
$r = 2GM$
$t = +\infty$
$r = 2GM$
$t = -\infty$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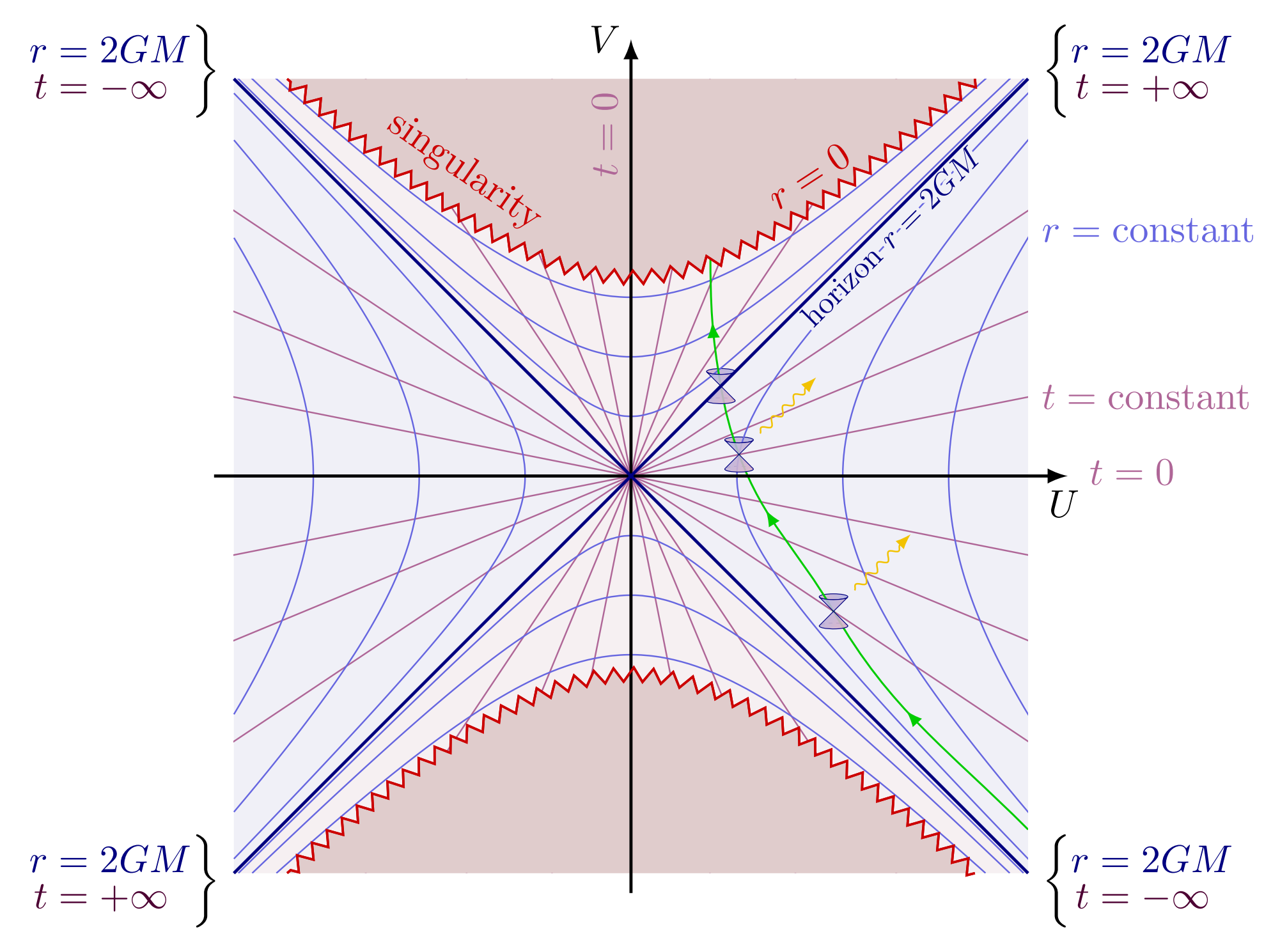
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