

## 3PN Binary BH Conservative Dynamics

$$\begin{aligned}
 H(t) &= m_1 c^2 + m_2 c^2 + H_N + \frac{1}{c^2} H_{[1PN]} \\
 &+ \frac{1}{c^4} H_{[2PN]} + \frac{1}{c^6} H_{[3PN]} + \dots \\
 &+ \frac{1}{c^5} H_{[2.5PN]}(t) + \frac{1}{c^7} H_{[3.5PN]}(t) + \dots
 \end{aligned}$$

$$\hat{H} = (H - M c^2) / \mu, \quad \mu = m_1 m_2 / M, \quad M = m_1 + m_2$$

$$\nu = \mu / M, \quad 0 \leq \nu \leq 1/4$$

test-body case:  $\nu = 0$ , equal-mass case:  $\nu = 1/4$

$$\text{CMS: } \mathbf{p}_1 + \mathbf{p}_2 = 0, \quad \mathbf{p} \equiv \mathbf{p}_1 / \mu,$$

$$p_r = (\mathbf{n} \cdot \mathbf{p}), \quad \mathbf{q} \equiv (\mathbf{x}_1 - \mathbf{x}_2) / GM, \quad \mathbf{n} = \mathbf{q} / |\mathbf{q}|$$