

Computation of lapse and shift

Evolution equations for γ_{ij} and π^{ij}

$$\frac{1}{c} \partial_t \gamma_{ij} = \frac{N}{\sqrt{\gamma}} (2\pi_{ij} - \pi_k^k \gamma_{ij}) + 2D_{(i} N_{j)}$$

$$\frac{1}{c} \partial_t \pi^{ij} = -\sqrt{\gamma} \left[N \left(R^{ij} - \frac{1}{2} \gamma^{ij} R \right) - D^i D^j N + \gamma^{ij} D_m D^m N \right]$$

$$+ \frac{N}{\sqrt{\gamma}} \left[\pi^{ij} \pi_k^k - 2\pi_k^i \pi^{kj} + \frac{1}{2} \gamma^{ij} \left(\pi^{kl} \pi_{kl} - \frac{1}{2} (\pi_k^k)^2 \right) \right]$$

$$- [\pi^{kj} D_k N^i + \pi^{ki} D_k N^j - D_k (\pi^{ij} N^k)]$$

$$+ \frac{8\pi G}{c^4} N \sum_{A=1}^N \frac{p_{Ak} p_{Al}}{m_A} \gamma^{ik} \gamma^{jl} \left(1 + \frac{p_{Am} p_{An}}{m_A^2 c^2} \gamma^{mn} \right)^{-\frac{1}{2}} \delta_A$$

Elliptic equations for N and $N^i \leftarrow \gamma_{ij} = \frac{1}{3} \gamma_{kk} \delta_{ij}$ and $\pi^{ii} = 0$