Wormhole Evolutions in n-dim Gauss-Bonnet gravity

poster B06

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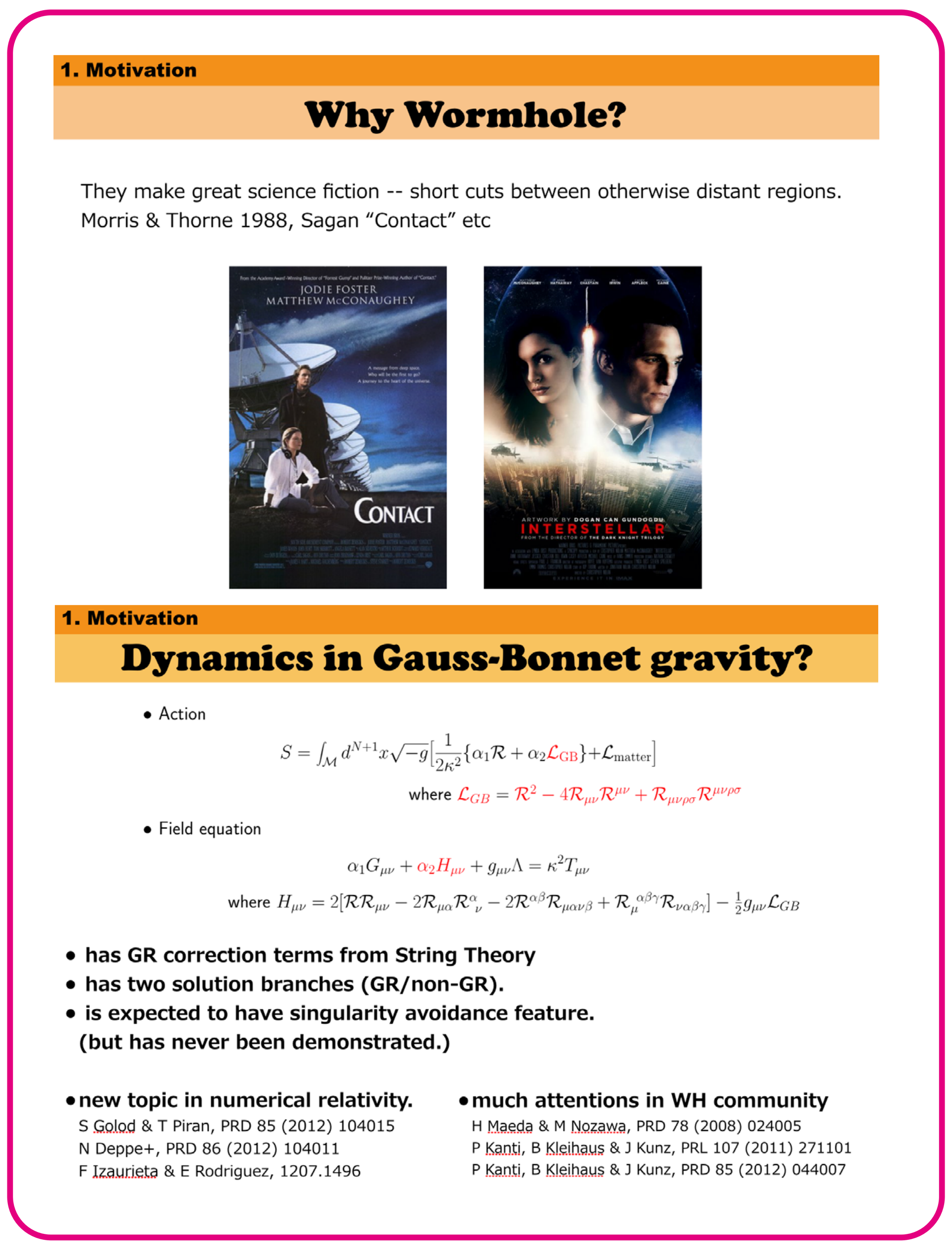
Previous Stories

(a) “Fate of Morris-Thorne (Ellis) wormhole” was numerically investigated in 2002. [HS & Hayward, PRD66, 044005].
The fate is either black-hole collapse or inflationary expansion, depending on the excessed energy.

(b) The n-dimensional GR Ellis wormhole solutions are obtained. Perturbation study suggests instability. [TT & HS, PRD88 (2013), 064023]. Numerical evolutions in 4-6 dim confirm its instability. [HS & TT, in preparation]

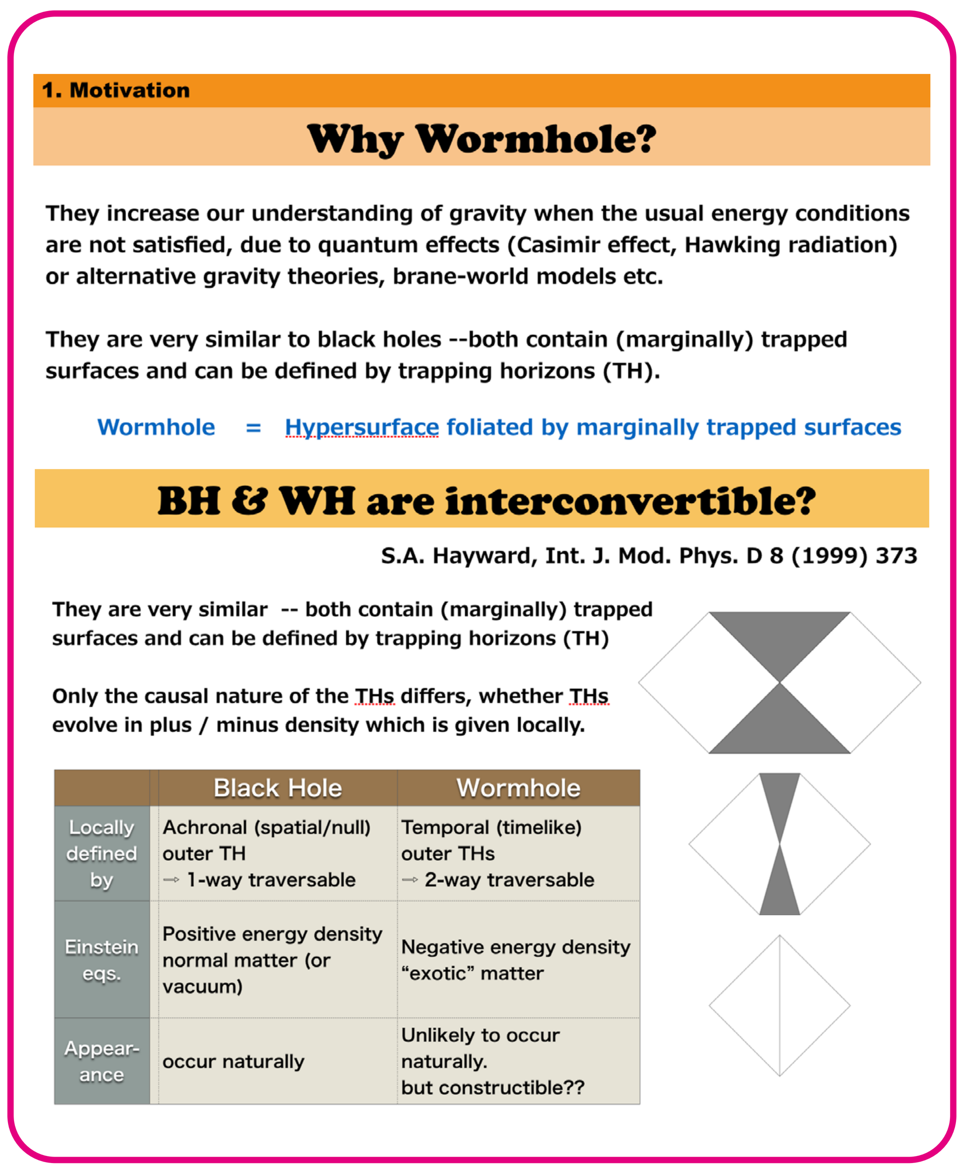
(c) The wormholes in anti-de Sitter spacetime are analyzed. Perturbation study suggests instability if throat is smaller than a half of AdS horizon. Numerical evolutions support this prediction. [TT & HS, in Poster B05.]



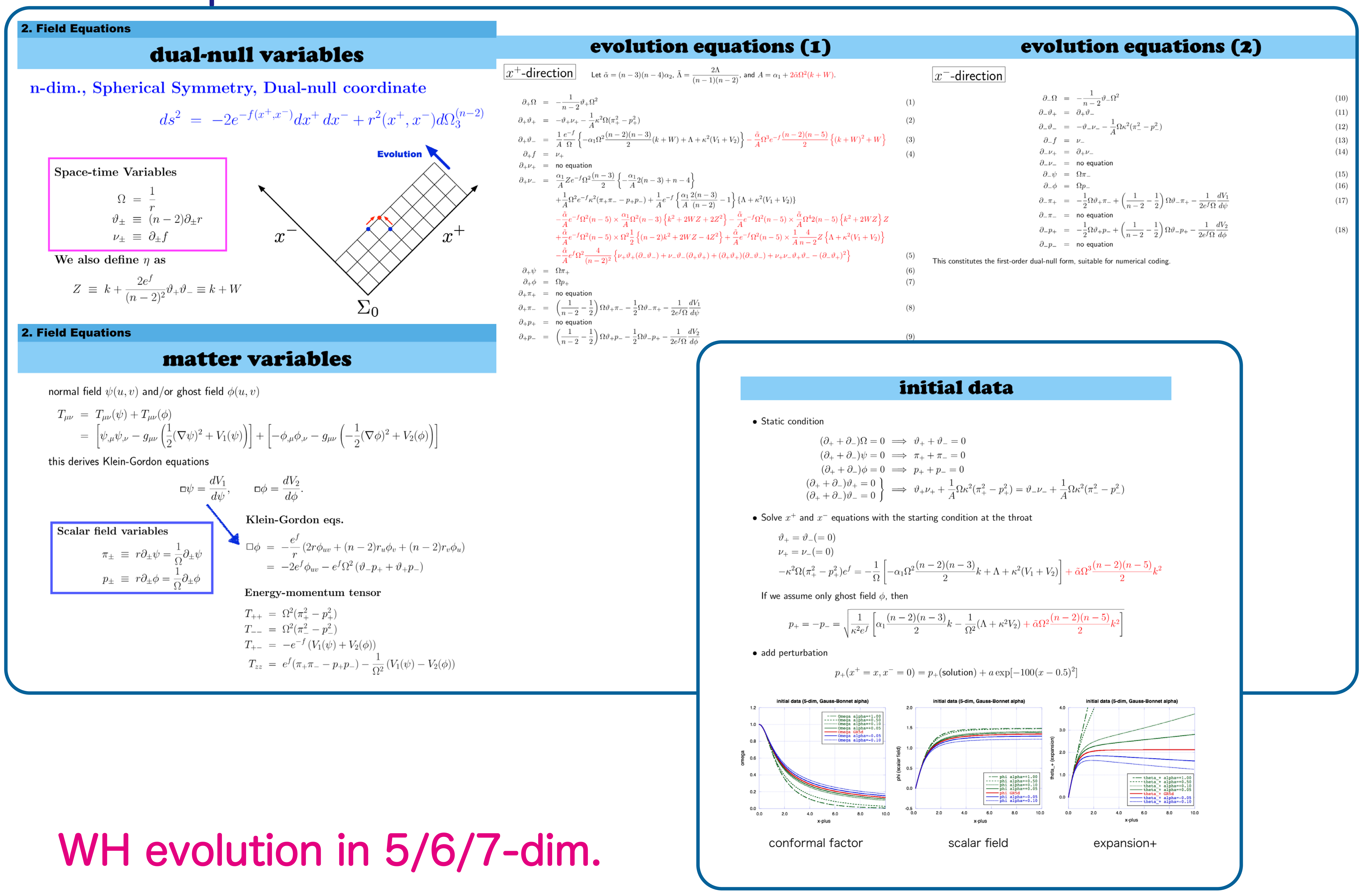
Outline & Summary

The dynamics of the simplest wormhole solutions in n-dimensional Gauss-Bonnet gravity are investigated numerically.
The solutions catch an unstable mode, and the throat begins inflate if GB coupling term is positive, while it turns into a black-hole if the coupling is negative. This horizon bifurcation can be seen easily in higher-dimensional spacetime. There exists the optimized positive coupling constant which maximizes the throat expansion.

Motivations

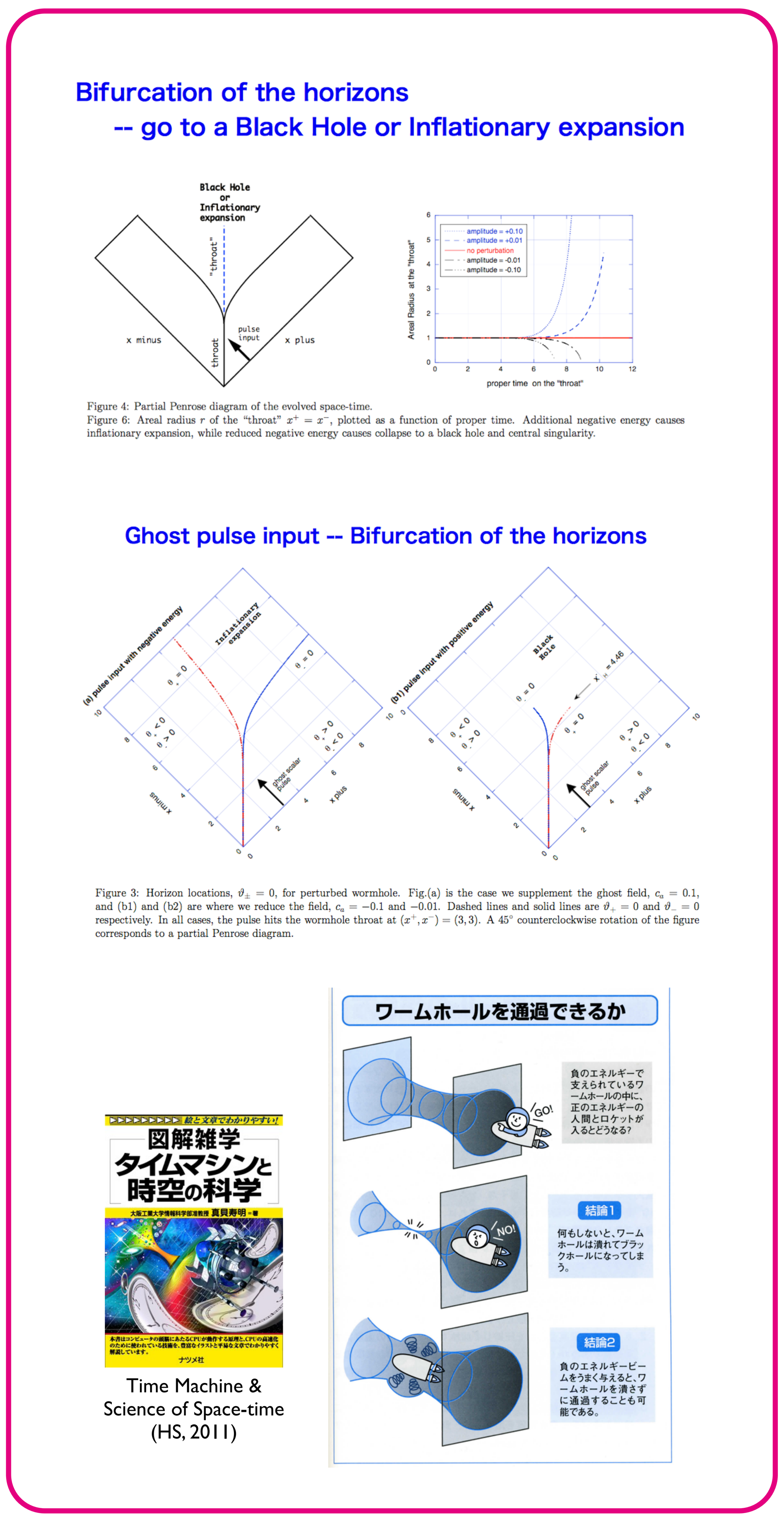


Field Eqs.



Results in 4-dim. GR

PRD66 (2002) 044005



WH evolution in 5/6/7-dim.