BI GALILEON THEORY

By Tony Padilla,
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Credits

Based on work done in collaboration with Paul Saffin & Shuang-Yong Zhou

Bi-galileon theory I: motivation and formulation.
Antonio Padilla, Paul M. Saffin, Shuang-Yong Zhou,
e-Print: **arXiv:1007.5424** [hep-th]

Bi-galileon theory II: phenomenology.
Antonio Padilla, Paul M. Saffin, Shuang-Yong Zhou,
e-Print: **arXiv:1008.3312** [hep-th]

Multi-galileons, solitons and Derrick's theorem.
Antonio Padilla, Paul M. Saffin, Shuang-Yong Zhou,
e-Print: **arXiv:1008.0745** [hep-th]

DGP GRAVITY

4-D gravity on a brane in 5-D Minkowski space.
G.R. Dvali, Gregory Gabadadze, Massimo Porrati
Phys.Lett.B485:208-214,2000.

THE STRONGLY COUPLED SCALAR

$$S_{DGP} = \int d^4x - \frac{M_{pl}^2}{4}\tilde{h}^{\mu\nu}\mathcal{E}\tilde{h}_{\mu\nu} - 3(\partial\pi)^2 - \frac{1}{\Lambda^3}(\partial\pi)^2\Box\pi + \frac{1}{2}\tilde{h}_{\mu\nu}T^{\mu\nu} + \frac{1}{2M_{pl}}\pi T + \text{other interactions}$$

strong coupling scale $\Lambda \sim M_5^2/M_{pl}$

physical graviton, $h_{\mu\nu} = \tilde{h}_{\mu\nu} + \frac{\pi}{M_{pl}}\eta_{\mu\nu}$

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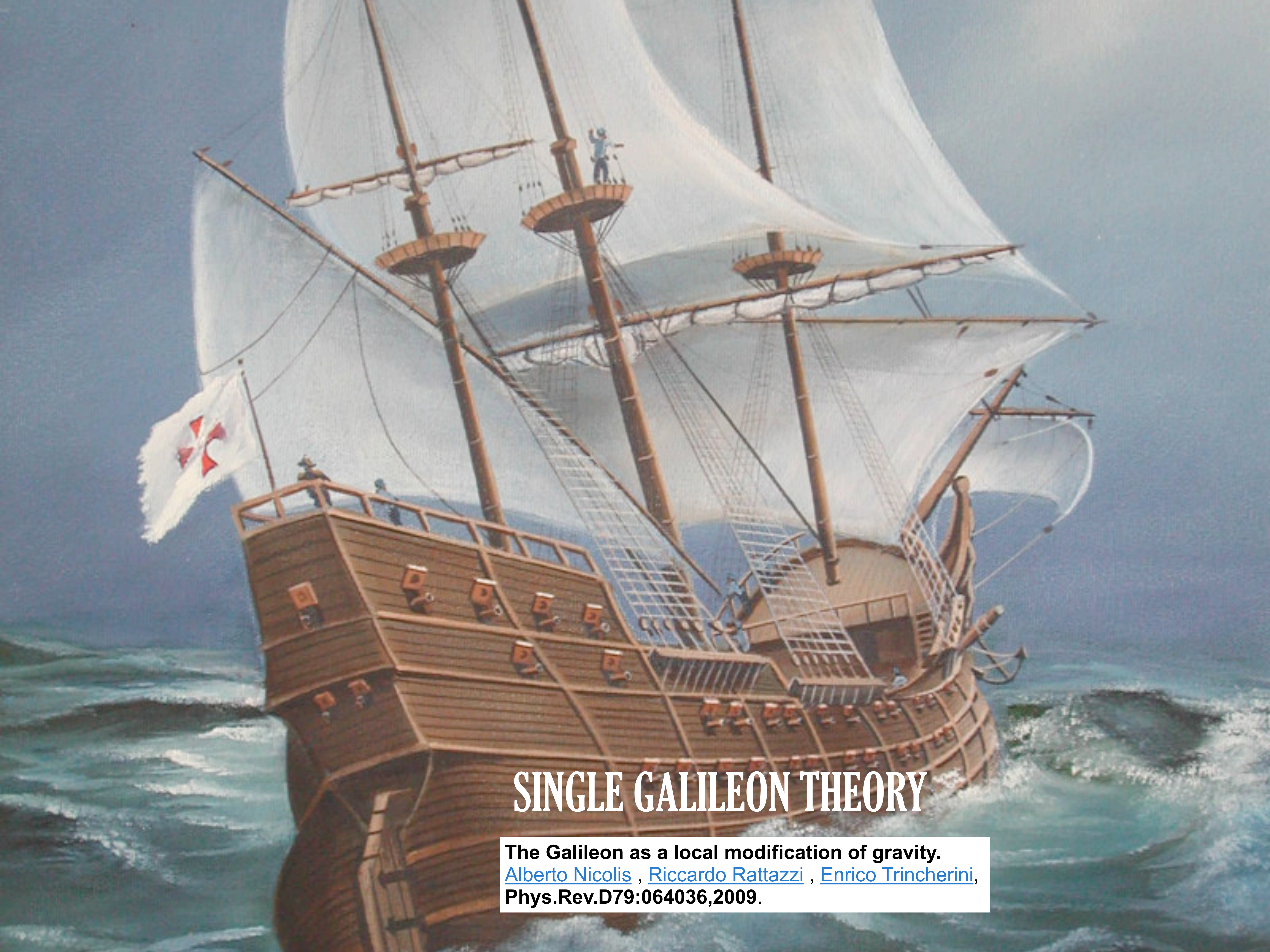
S_{DGP} →

$$S[\pi] = \int d^4x\mathcal{L}_\pi + \frac{1}{2M_{pl}}\pi T$$

The π-Lagrangian, $\mathcal{L}_\pi = -3(\partial\pi)^2 - \frac{1}{\Lambda^3}(\partial\pi)^2\Box\pi$



SINGLE GALILEON THEORY

The Galileon as a local modification of gravity.
Alberto Nicolis , Riccardo Rattazzi , Enrico Trincherini,
Phys.Rev.D79:064036,2009.

Galilean invariance

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Most General pi-lagrangian

$$\mathcal{L}_\pi = c_1\pi + c_2\left[-\frac{1}{2}(\partial\pi)^2\right] + c_3\left[-\frac{1}{2}(\partial\pi)^2\Box\pi\right] + c_4\mathcal{L}_4 + c_5\mathcal{L}_5$$

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Generic Modified gravity theories

$$S_{gal} = S\left[\tilde{h}\right] + S[\pi]$$

$$S[\pi] = \int d^4x\mathcal{L}_\pi + \pi T$$

$$S[\tilde{h}] = \int d^4x - \frac{M_{pl}^2}{4}\tilde{h}^{\mu\nu}\mathcal{E}\tilde{h}_{\mu\nu} + \frac{1}{2}\tilde{h}_{\mu\nu}T^{\mu\nu}$$

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MODELS WITH CONSISTENT SELF ACCELERATION?

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CANNOT SATISFY ALL CONDITIONS SIMULTANEOUSLY

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most general pi-xi Lagrangian

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$$\mathcal{E}_{m,n} = (m+n)!\delta^{\mu_1}_{[\nu_1} \dots \delta^{\mu_m}_{\nu_m} \ \delta^{\rho_1}_{\sigma_1} \dots \delta^{\rho_n}_{\sigma_n]} (\partial_{\mu_1}\partial^{\nu_1}\pi) \dots (\partial_{\mu_m}\partial^{\nu_m}\pi) \ (\partial_{\rho_1}\partial^{\sigma_1}\xi) \dots (\partial_{\rho_n}\partial^{\sigma_n}\xi) \, .$$

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Multi-galileons with internal symmetries (eg So(N)) can!!!!

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LOTS MORE TO DISCOVER...