

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

## The "Legendre scalarization" of nonlinear gravity theories

**This is a pre print version of the following article:**

*Original Citation:*

*Availability:*

This version is available <http://hdl.handle.net/2318/1946292> since 2024-01-05T11:47:49Z

*Published version:*

DOI:10.1142/S0219887824501147

*Terms of use:*

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

















LQR- i?2 p `B liBQM`X7Q i?2 K2i`B+ ;Bp2b UBM i?2 b2[m2H r  
iQ /2MQR(B)M#v - iQ pQB/ KBbmM/2`bi M/BM;bV

$$R \frac{1}{2}Rg = \frac{1}{2} r f(r) g \frac{1}{2}r r + \frac{1}{4}r r g + T^{(mat)} UkyV$$

r?BH2 i?2 p `B iBQM prXb X iQ

$$2 = r:$$

UkRV

`2 i?2b2 2[m iBQM b 2[mBp H2Mi iQ UkV\ Ai QM2 i F2b 7  
p= f<sup>0</sup>(R(g)) - i?2(M; ) `2 2t+iHv i?2 b K2(g; p)BQ#H+2b`BM;  
BM UR3VX h?mb- bBM+2 Bi? b #22M T`Qp2M i? i UkV Bb 2[n  
UR3V- i?2 2[m iBQM b #Qp2 b?QmH/ #2 2[mBp H2Mi iQ UR3V  
h?2 i`Qm#H2 Bb i? i i?2 p `B iBQM EL QrXiX2iCQ2bM; B M  
MQiB2H/ i?2 2 R(g) iBQM- bQ i?2 `2H= ifB(R(g)) + MMQi #2  
/2`Bp2/ 7`QK i?2 }2H/ 2[m iBQM b UBM +QMi` bi iQ UR3V- r?2  
#2 `2+Qp2`2/ #v +QK#BMBM; i?2 b2+QM/ 2[m iBQM rBi? i?2  
2[m iBQM VX q2 QMHv FMQR- #(v)i?2 fQ(M)BiBQM Q7  
A7 Bir2`2 i`R(g) +?r(i) U M/ 2[mBp H2(R(g))V QM HH bQ @  
HmiBQM b Q7 i?2 }2H/ 2[m iBQM B f(R) = MRQM?Bh?2QimFB/M; p2  
i?2 i` +2 Q7 UkV QM 22 f(R) = 2(MR) i 2 1/3 f<sup>0</sup>(R)R + 1/3 T<sup>(mat)</sup> g X  
6Q` BMbi M+2- H2i mb +?2+F r? fi(R) ≠ R2 MR6 B?MB i??2 + b2  
Bb +QM bB/2`2/ #v i?2 mi?Q`b BM i?2 bm#b2[m2Mi b2+iBQM  
i?2 p +mmK + b2- 7Q` bBKTHB+Biv(X=A-M i? Bb i? 2 2 QM2 ? b  
1BMbi2BM @ G2; 2M/`2 G ;` M; B M #2+QK2b

$$L_{EL} = R(g) + \frac{(1)^2}{4} + \frac{1}{2}g r r \quad p \overline{ij}; \quad Uk k V$$

?2M+2 QM2 }M/b i?2 2[m iBQM b

$$R \frac{1}{2}Rg = \frac{(1)^2}{8}g \frac{1}{2}r r + \frac{1}{4}r r g \quad Uk j V$$

M/

$$2 = \frac{1}{2}: \quad Uk 9 V$$

h FBM; i?2 i` +2 Q7 UkjV QM2 }M/b

$$R = \frac{1}{4}r r + \frac{(1)^2}{2} \quad Uk 8 V$$

r?B+? Bb +QKT RB#H2 QM Hv BmH}HHb i?2 }`bi Q`/2` 2[m iBQ  
r r = 2( 1)( 2)- r?B+? /Q2b MQi?QH/ BM ;2M2` H 7Q` bQI



Q++m`b i bBM;mH `Biv Q7 i?2 G2;2M/`2 i` Mb7Q`K iBQM UE  
TH2R=i aV- r?2`2 i?2 7f(M)+BBQMMp2`i?2H2bb bKQQi?, i?2`27  
bQHmiBQM Q7 i?2 Q`B;BM H7Qm`i? Q`V/2? BQ/;2H+Q i?2b'TQ  
bQHmiBQM b rBi? /Bz2`2Mi TQi2MiB Hb 7Q' i?2 b+ H  
bT +2 iBiKb2XKb i? i bvbi2K iB+ BMp2biB; iBQM Q7 i?2 TQ  
iBQM b Q7 i?Bb 7 +i BM +QbKQHQ;v Bb biBHH H +FBM;X

□□□□□□□□□□

(RS). Cotsakis, J. P. Mi mos o1anè X SJ? vb X C X r U k y ksj V  
3j,9jjX

(kP). W. Hi g ns Q,pQ □B K X N8NV 3Re  
G. Bickn G X S T vb X RNd9V RyeR  
P. Teyssandier, PCXTJoiu X S□ vb X  
B. Whi S T yb X G2□ XURN39V RdeX

(jC). H. Br ã H sb,bX Zm Mir □ KURN33V- GRNdX  
M. Ferraris, M. Francavigli a Habn b X G.m Maign Kano,  
: ` p X URNNyV- keRX

(9Y). Faraoni, E. Gunzig and `B.Bp Nã`r2ã òBhMi  
;` @ [+fN3RRy9d URNN3VX

(8S). Capozziello, P. Martin-Mor u r S? vabr B ã b C. Rub a  
G2ii2` □□□□□□□□ UkyRyV- RRdX

(e). Kijow 2MX \_2H iX □ U B B i c X 3V- 38dX

(dG). Magnano, M. Ferraris and M.MXr\_2H X av p X l i a,  
□□ URN3dV- 9e8X

(3A). Jakubiec, J.: 2MX \_o2H X □ U B X 3dV dRNc S?vbX \_2pX  
□□ URN33V R9yec CX J i?X S?vbX jy URN3NV Rydjc CX J i?)  
kNkjX

(NG). Magnano, M. Ferraris, MH Fbb X rZma Mi Xg:l` ipX,  
□ URNNyV- 88dX

(R G). Magnano, M. Ferraris, MCXFJ à?nXc S?vbX l i a,  
jRURNNyV- jd3X

(R B). Magna AMi,2`MX CX :2QKX J2i?X □□□□□□/2y MeS?vbX  
Re9yyyeX

- (Rk). Kij o ~~W~~sk 2` ,MX CX : 2 Q K X ~~U~~ ~~J~~ R Y R S e ? w - b R e 9 y y y 3 X
- (Rj). Magnano, L. M. So ~~M~~ ~~M~~ X ~~S~~ ~~V~~ ~~v~~ ~~k~~ X ~~U~~ ~~L~~ X ~~k~~ ~~y~~ ~~y~~ ~~V~~ R X
- (R). Magnano, L. M. S ~~S~~ ~~R~~ ~~v~~ ~~b~~ ~~X~~ ~~U~~ ~~L~~ ~~X~~ ~~k~~ ~~y~~ ~~y~~ ~~V~~ R N N 9 V 8 y j N X
- (R). H. Di ~~S~~ ~~R~~ ~~v~~ ~~b~~ ~~X~~ ~~U~~ ~~L~~ ~~X~~ ~~k~~ ~~y~~ ~~y~~ ~~V~~ R N e k V k R e j
- (R). von Helmholtz, M b + ? 7 i H B + ? 2 # ? M / H m M ; 2 M  
X " ` i ? U G 2 B T x B ; R 3 N 8 V - k y j X
- (R). Borowiec, A. ~~C~~ ~~K~~ ~~o~~ ~~\*Q~~ ~~b~~ ~~K~~ ~~Q~~ ~~H~~ ~~Q~~ ; v M / b i ` Q T ` i B + H 2 S ? v  
k y k y X y d U k y k y V y y j X
- (R). Pinto, L. Del Vecchio, L. Fatibene and M. ~~C~~ ~~X~~  
\* Q b K Q H Q ; v M / b i ` Q T ` ~~U~~ ~~H~~ ~~2~~ ~~S~~ ~~V~~ ~~b~~ ~~9~~ ~~9~~ ~~X~~  
L. Del Vecchio, L. Fatibene, S. Capozziello,  
Pinto and S. ~~C~~ ~~l~~ ~~a~~ ~~m~~ ~~o~~ ~~r~~ ~~S~~ ~~a~~ ~~v~~ ~~b~~ ~~X~~ ~~U~~ ~~L~~ ~~X~~ ~~k~~ ~~y~~ ~~y~~ ~~V~~ R N V