



The University of
Nottingham

UNITED KINGDOM · CHINA · MALAYSIA

LEVERHULME
TRUST

Using SELCIE to investigate screened scalar field models sourced by complex systems

By C. Briddon, C. Burrage, A. Moss, & A. Tamosiunas.

University of Nottingham

Chameleon Mechanism

- We will assume a field potential of the form:

$$V(\phi) = \Lambda^4 \left(1 + \left(\frac{\Lambda}{\phi} \right)^n \right)$$

- The static field equation is therefore:

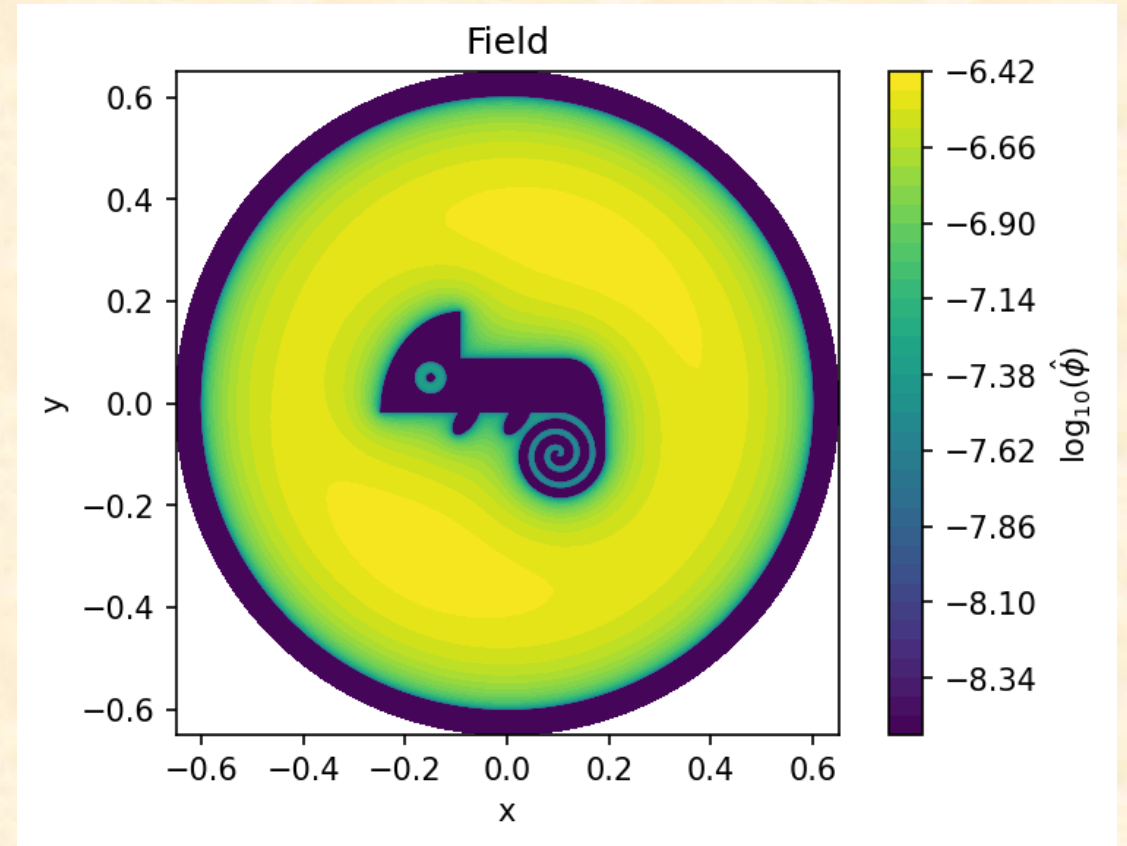
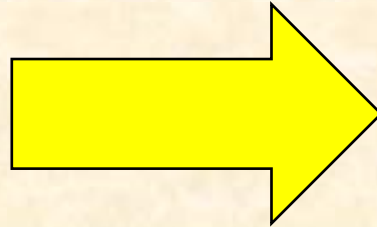
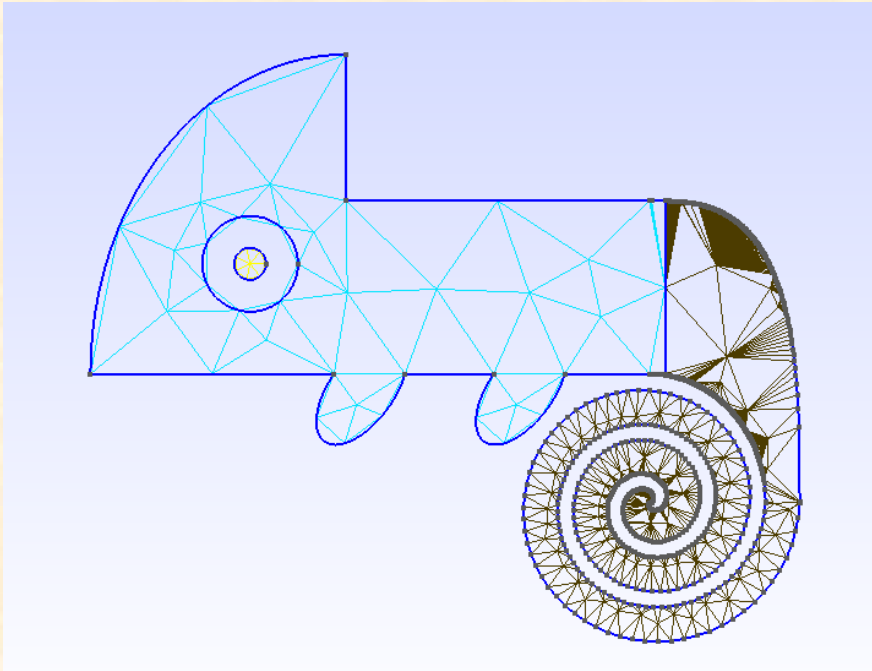
$$\nabla^2 \phi = -\frac{n\Lambda^{n+4}}{\phi^{n+1}} + \frac{\beta\rho}{M_{pl}}$$

- The corresponding Compton wavelength of:

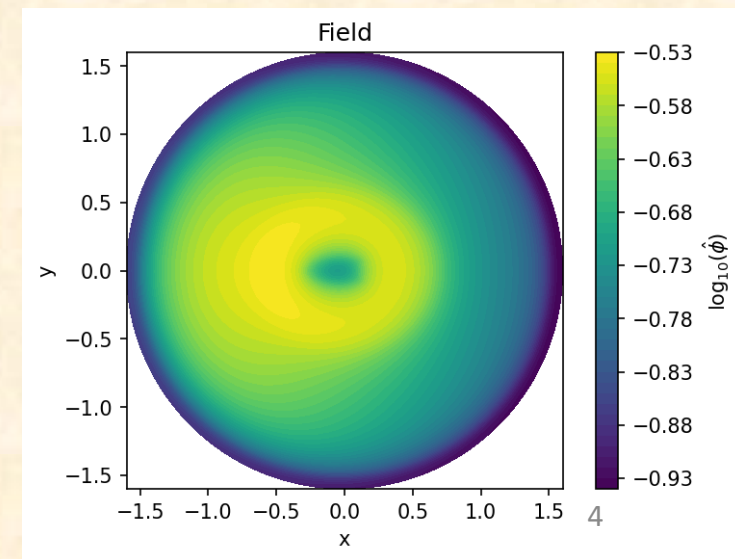
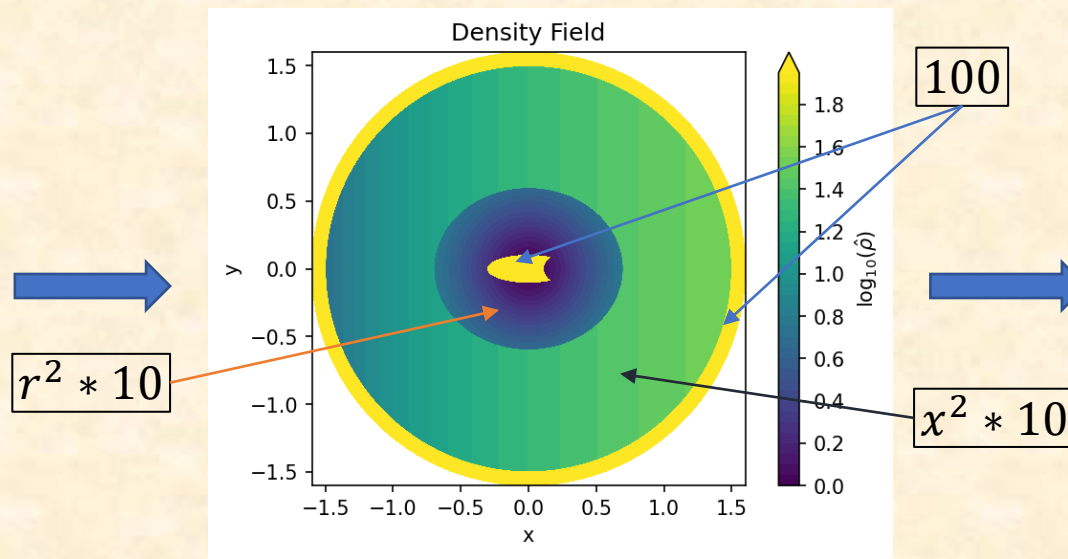
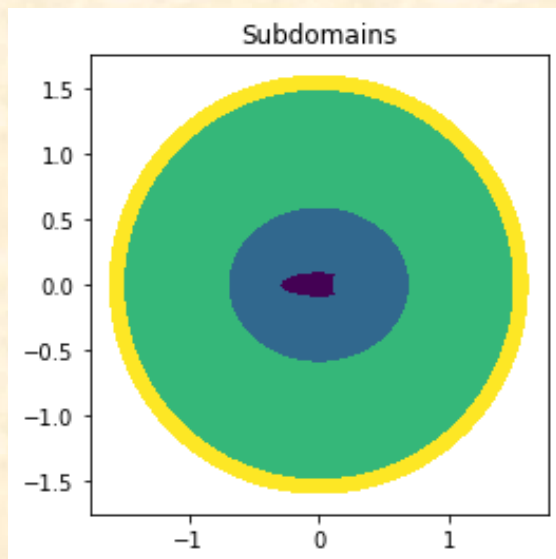
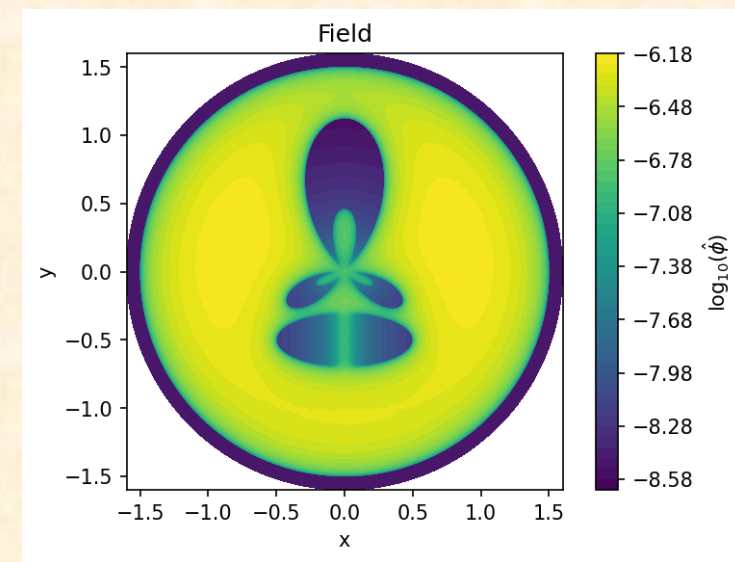
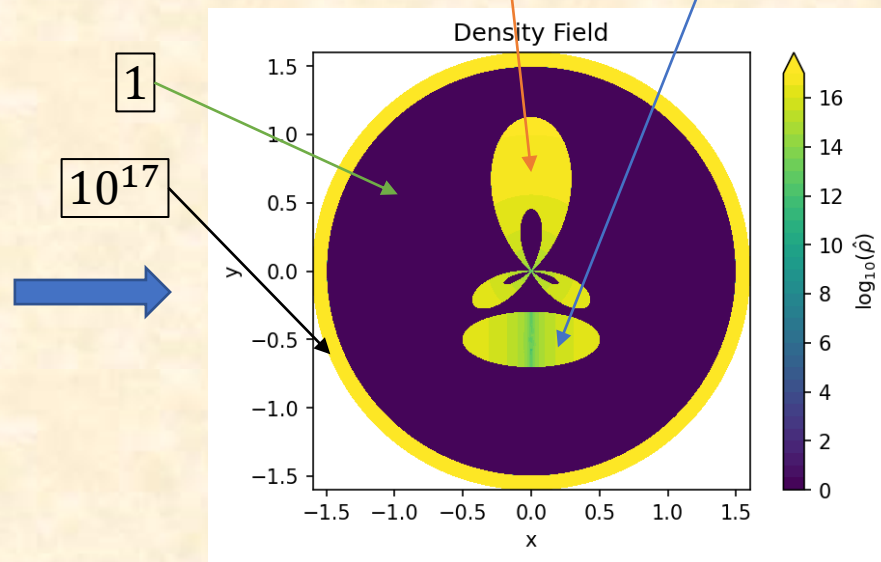
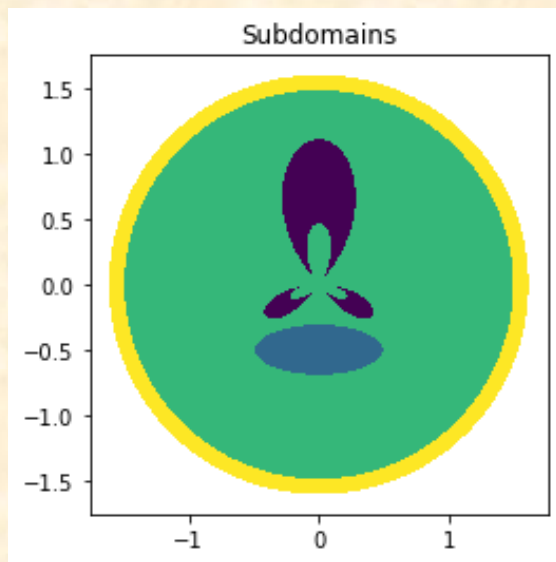
$$\lambda^2 = \frac{(n\Lambda^{n+4})^{1/(n+1)}}{(n+1)} \left(\frac{\beta\rho}{M_{pl}} \right)^{-\frac{n+2}{n+1}}$$

- We see as ρ increases λ decreases leading to the field being screened.

The chameleon of a chameleon



Some Examples



Thank you for listening

ArXiv: [arXiv:2110.11917](https://arxiv.org/abs/2110.11917), [arXiv:2108.10364](https://arxiv.org/abs/2108.10364), [arXiv:2206.06480](https://arxiv.org/abs/2206.06480)

Github: [GitHub - C-Briddon/SELCIE](https://github.com/C-Briddon/SELCIE)

Email: chad.briddon@nottingham.ac.uk