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### **Searching for dark energy with matter wave interferometry**

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The nature of dark energy, which makes up 70% of the mass-energy of the universe, remains completely unknown. Chameleons are a simple scalar model for dark energy that mediate a force which is screened by bulk matter. However we can now probe these scalar fields using atoms as nearly ideal test masses in the vacuum of our cavity-based matter wave interferometer [1, 2]. Our first measurements ruled out a range of chameleons that would reproduce the observed cosmic acceleration [3]. Since then we have improved sensitivity by a factor of 100. With a similar future improvement, we will be sensitive to any possible chameleon field and other exotic models for dark energy and dark matter, such as symmetrons or  $f(R)$  gravity.

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[2] P. Hamilton, M. Jaffe, J.M. Brown, L. Maisenbacher, B. Estey, H. Müller, Phys. Rev. Lett. **114**, 100405 (2015)

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