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Soft inclusion in a confined fluctuating active fluid AMIT SINGH, Simons Centre for the Study of Living Machines, National Centre for Biological Sciences (TIFR), Bangalore 560065, India, J F RUPPRECHT, G V SHIVSHANKAR, JACQUES PROST, Mechanobiology Institute and Department of Biological Sciences, National University of Singapore, Singapore, MADAN RAO, Simons Centre for the Study of Living Machines, National Centre for Biological Sciences (TIFR), Bangalore 560065, India — We study the dynamics of an inclusion in a 1D confined active fluid with athermal fluctuations. To highlight various features and to appeal to different contexts, we treat the inclusion in turn as a rigid element, a passive elastic element and an active elastomer. We show that in general, the active dynamics of the shape and position of the inclusion are described by coupled Langevin equations with a confining potential and *multiplicative* noise. The steady state distribution computed exactly from the resulting Fokker-Planck equation, exihibits a transition as a function of the relative strength of the confining potential and athermal noise. Our study is of relevance to the positioning and shape of (i) the nucleus embedded in the active cytoplasm, (ii) chromosomes within the nucleus, (iii) nuclei in multi-nucleated cells, and (iv) the fluctuations of a cell within a developing tissue.

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