This is not what is observed in the present case. A geometrical barrier driven hysteresis is unlikely to contribute due to the large aspect ratio for the In cylinders in the mesoscopic regime. The differences the topology of normal domains during flux entry (tubular) and flux exit (lamellar) leads to topological hysteresis. In macroscopic samples, the occurence of topological hysteresis was notionally understood by assuming the presence of a surface barrier during flux entry, which was absent during flux exit such that a large number of laminae are connected to the sample edge during flux exit leading to a continuous flux exit. in contrast during flux entry, normal domains are pulverized into smaller pieces during flux entry. Recent MOI measurements lead to a more refined understanding of the phenomena. Recent theoretical work by Berdiyorov et al suggested the possibility of a confinement (topology) enriched hysteresis with the possibility of the existence of a plethora of metastable states. Our observations appear to be in good agreement with their proposal. In addition we observe signatures of superheating and supercooling across the N-SC transition in the mesoscopic regime. There exists ample evidence in the literature for superheating/supercooling induced asymmetry in M-H measurements with accompanying hysteresis in the case of first order order-disorder transition across peak effect phenomena in type-II superconductors. An analogy can be drawn to explain the observed asymmetry in the present case. Due to the absence of directionality with respect to the applied field in the present case for the nanowires, the demagnetization correction is not possible, however such a correction is just expected to renormalize the observed M values. The present results on hysteresis and the accompanying metastability effects in the intermediate state of mesoscopic type-I superconducting Indium attempts to provide a glimpse into the richness of the phenomena. Based on the observations of superheating and supercooling in the intermediate state across the SC-N transition, interesting physical analogy could be made for other systems where the competition and interplay between short-range interactions associated with a positive interfacial energy and the long range magnetostatic/electrostatic/elastic interactions lead to a spatial modulation in phases, e.g., by tuning suitable parameters, the rate of forward (backward) reaction could possibly be modified in a typical reaction-diffusion system.

In conclusion, we report the observation of topological hysteresis in a collection of mesoscopic cylinders of type-I superconducting In. We demonstrate the occurence of a plethora of metastable magnetic configurations, depending on the exact recipe followed to obtain a particular configuration. Also reported is the occurence of the phenomena of superheating