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De-wetting of thin films: Analytic theory of cluster coarsening dynamics ADI CONSTANTINESCU, Asia Pacific Center for Theoretical Physics, Pohang, South Korea, LEONARDO GOLUBOVIC, West Virginia University, ARTEM LEVANDOVSKY, University of California Riverside — Long range de-wetting forces acting across thin films, such as the fundamental van der Waals interactions, may drive the formation of large clusters (tall multi-layer islands) and pits, observed in thin films of soft materials (polymers), as well as in thin films of liquid and solid metals. These long range de-wetting interactions introduce a distinct long lasting early-time scaling behavior characterized by a slow growth of the cluster height/lateral size aspect ratio (i.e., a time-dependent Young angle), and by effective coarsening exponents that depend on cluster size. In this study, we develop an analytic theory capable to calculate these effective size-dependent coarsening exponents characterizing the cluster growth in the early-time cross-over regime. Such a pronounced cross-over behavior has been indeed seen in experiments; however its physical origin has remained elusive to this date. Our results attribute these observed phenomena to ubiquitous long range de-wetting interactions acting across thin films.

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