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Localized patterns and narrow escape problems in more general geometries

The main focus of this talk will be on a method for analyzing localized spot patterns on general surfaces. Past analytic frameworks have been restricted to analyses on flat and spherical surfaces; we discuss a new addition to the analytic framework that allows us to obtain results on more general (and perhaps more realistic) surfaces. We also discuss briefly recent results obtained for the narrow escape problem inside an arbitrary bounded three-dimensional domain with a small target on the boundary. Methods used for these problems may provide a way forward for understanding how cell geometry impacts processes such as cell polarization.