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Characterizing Capture-Zone Distributions: Generalized Wigner vs. Alternative Forms, and Experimental Fits[1] T.L. EINSTEIN, ALBERTO PIMPINELLI[2], U. of Maryland, College Park — In problems of growth of islands or of dots, it is often advantageous to consider the distribution of the areas of proximity (Voronoi) cells of nucleation sites, i.e. the capture zones (CZ). Extending results for terrace-width distributions on vicinal surfaces, [3] we have shown that the (non-equilibrium, steady-state) CZ distribution is well described by the generalized Wigner expression $P_\varrho(s) = as^\varrho \exp(-bs^2)$ [with a and b being constants assuring normalization and unit mean, and s here the CZ area divided by its mean], which accounts for a strikingly broad range of fluctuation phenomena. For CZ distributions we find that the single adjustable parameter $\varrho = (2/d)(i+1)$, where i is the size of the critical nucleus and d (= 1 or 2) the spatial dimensionality.[4] We emphasize comparisons with other fitting expressions (esp. gamma functions), new applications to experimental data, and the generality of $P_\varrho(s)$.

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[2]Also U. Blaise-Pascal, Clermont-2, Aubière, France
[3]AP et al., PRL 95, 246101 (2005); TLE, Appl. Phys. A 87, 375 (2007)
[4]A. Pimpinelli and T.L. Einstein, PRL 99, 226102 (2007).

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