

Abstract Submitted
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Terrace-Width Distributions (TWDs) of Touching Steps: Modification of the Fermion Analogy, with Implications for Measuring Step-Step Interactions on Vicinals¹ T.L. EINSTEIN, RAJESH SATHIYANARAYANAN², AJMI BH. HAMOUDA³, KWANGMOO KIM, U. of Maryland — Using Monte Carlo simulations, we compute⁴ the TWDs of surfaces in which steps can touch each other, forming multiple-atomic height steps, but cannot cross (no overhangs), and so inconsistent with the standard mapping to spinless fermions. Our numerical results show that the generalized Wigner distribution, with minor modifications at small step separations, gives a very good fit for TWDs of touching steps. (We also generate analytic results by generalizing results for extended fermions.⁵) The interaction strength derived from the fit parameter ϱ indicates an effective attraction between steps, weakening the overall repulsion. The strength of this effective attraction decreases for larger mean-step separations and decreasing step-touching energies; describable via finite-size scaling. Hence, accurate extraction of the true repulsion strength requires multiple vicinalities.

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⁴RS, ABH, and TLE, Phys. Rev. B 80 (2009) 153415.

⁵Siew-Ann Cheong and C.L. Henley, arXiv:0907.4228v1.

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