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**Composition-tuned smeared phase transitions** DAVID NOZADZE, FAWAZ HRAHSEH, CHRISTOPHER SVOBODA, THOMAS VOJTA, Missouri University of Science and Technology — Phase transitions in random systems are smeared if individual spatial regions can order independently of the bulk system. We study such smeared phase transitions (both classical and quantum) in substitutional alloys  $A_{1-x}B_x$  that can be tuned from an ordered phase at composition  $x = 0$  to a disordered phase at  $x = 1$ . We show that the ordered phase develops a pronounced tail that extends over all compositions  $x < 1$ . Using optimal fluctuation theory, we derive the composition dependence of the order parameter and other quantities in the tail of the smeared phase transition. We also investigate the influence of spatial disorder correlations on smeared phase transitions. We compare our results to computer simulations of a toy model, and we discuss experiments.

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