

Ising Strips, Confinement and All That

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This presentation will describe new, exact calculations of the local magnetisation in Ising strips with, and without, surface magnetic fields. The results will show the interplay of various length scales in the system; these include the bulk phase correlation length, the capillary length and the wetting film thickness. This work also leads into a resolution of the thorny problem of intrinsic structure: can a capillary wave-type of distribution be attached to an intrinsic structure by convolution? As calculations show, this is fundamentally incorrect. But we can define a *basis*, the elements of which are termed *domain wall states*, which is compatible with the notion of capillary waves in which the local magnetisation is described by an *off diagonal* matrix. Were the intrinsic structure hypothesis to be correct, this matrix would be purely diagonal, which is not the case. It is important to note that these results do not invalidate the concept of an interface Hamiltonian; rather, they give a precise interpretation and justification of this notion which is vital to a great many applications. A new example will be given of the geodesic-zigzag transition which has been reported over the past few years for systems with grain boundaries. Finally, the status of “entropic” fluctuation effects, which induce thermal Casimir forces, will be reviewed and some new results presented.