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Random matrices meet trapped fermions

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I will review some recent results exploring the connection between non-interacting fermions in a d-dimensional trapping potential and random matrix theory. The presence of the trap introduces an edge where the average density of fermions vanishes. Far from the edge, near the centre of the trap (the so called "bulk regime"), physical properties of the fermions have traditionally been understood using the Local Density Approximation. However, this approximation drastically fails near the edge where the density vanishes. In this talk, I will show that, even near the edge, novel universal properties emerge, independently of the details of the confining potential. These universal correlations can be described by random matrix theory (in one dimension and at zero temperature) and by more general determinantal processes in higher dimensions and finite temperature.

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Primary author: SCHEHR, Gregory (Universite Paris-Sud, CNRS)

Presenter: SCHEHR, Gregory (Universite Paris-Sud, CNRS)

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