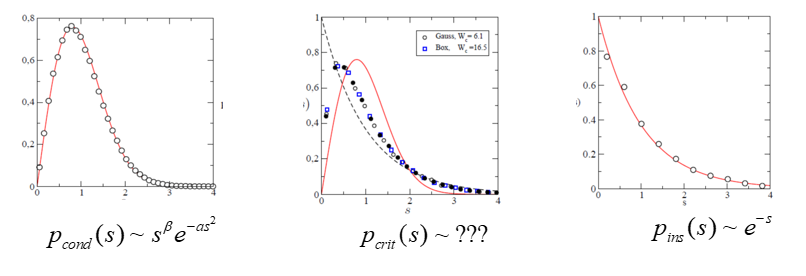
**Energy Level Fluctuations**

As the impurity positions are varied, the energy levels will vary as well, and so the energy levels are in fact random variables, like the conductance we consider later. In 3D, there is a qualitative difference between the probability distribution of the levels (same number of levels is shown in each plot). I believe these results below are obtained with RMT. Note that we must presuppose a closed system (clamped or periodic boundaries), since only that makes the k-spectrum discrete and the eigenenergies to have some finite average spacing

Vis a vis the picture above…maybe instead of taking statistical ensemble to be difference between given two levels subject to impurity rearrangement, could take it to be set of adjacent energy level differences for a given impurity arrangement (but this would have to be done over a range for which density of states is constant?).



Can see that in the metallic case, the energy levels are roughly evenly spaced and there is vanishing probability of degeneracy (this is called level repulsion). But as disorder is increased they become more degenerate and, rather consequently, more spaced (this makes sense in context of transport, as the spatially overlapping states are now further apart in energy). Let the random variable ∆x = distance between two adjacent energy levels. And let s = ∆x/<∆x>. Turns out in the thermodynamic limit, the probability distributions converge to universal limits, independent of disorder…, but dependent on symmetry of course.