



UNIVERSITÄT  
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# Seminar

Bielefeld - Melbourne Random Matrices

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## Harmonically confined Riesz gas in one dimension

I will discuss one dimensional Riesz gas of  $N$  particles confined in a harmonic potential. The interaction between any pair of particles at positions  $x_i$  and  $x_j$  is repulsive and behaves as  $\text{sgn}(k) |x_i - x_j|^{-k}$  for  $i \neq j$ , where  $k > -2$ . For  $k = -1$ , this model represents the one dimensional one component plasma, for  $k \rightarrow 0$  it represents Dyson's log-gas that appears in random matrix theory and for  $k = 2$ , it represents the classical Calogero-Moser model. We will first compute the average density in the large  $N$  limit explicitly for all  $k > -2$ . Next, we will compute the exact average density (large  $N$  limit) in the presence of a hard wall at  $x = w$ . Finally, I will discuss the statistics of the position of the rightmost particle in the gas, and will compute the explicit large deviation functions of its distribution. We will see that the left tail exhibits a third order phase transition for all  $k > -2$ .

**Wednesday, 30 November 2022,  
0900 hrs CEST**

Zoom Konferenzschaltung— Please contact Leslie Molag  
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