

Sub-Poissonian Statistics of Jamming Limits in Ultracold Rydberg Gases

Wed, 2017-07-12 00:19 - [Servaas Kokkelmans](#) [1] **Date:** 2015-07-23 - 2017-07-12

Author(s):

J. Sanders, M. Jonckheere, and S. Kokkelmans

Reference:

Phys. Rev. Lett. 115, 043002 (2015)

URL:

<https://journals.aps.org/prl/pdf/10.1103/PhysRevLett.115.043002> [2]

Several recent experiments have established by measuring the Mandel Q parameter that the number of Rydberg excitations in ultracold gases exhibits sub-Poissonian statistics. This effect is attributed to the Rydberg blockade that occurs due to the strong interatomic interactions between highly excited atoms. Because of this blockade effect, the system can end up in a state in which all particles are either excited or blocked: a jamming limit. We analyze appropriately constructed random-graph models that capture the blockade effect, and derive formulae for the mean and variance of the number of Rydberg excitations in jamming limits. This yields an explicit relationship between the Mandel Q parameter and the blockade effect, and comparison to measurement data shows strong agreement between theory and experiment.

- [12.10.+i Simulations of many-body interactions](#) [3]
- [H2020](#) [4]
- [QIPC](#) [5]
- [RySQ](#) [6]
- [05.10.+s Quantum information & quantum statistics](#) [7]
- [Result](#) [8]
- [Quantum Simulation](#) [9]
- [15.10.Ry Rydberg atoms](#) [10]

Source URL:

<http://qurope.eu/db/publications/sub-poissonian-statistics-jamming-limits-ultracold-rydberg-gases>

Links:

[1] <http://qurope.eu/users/servaas>

[2] <https://journals.aps.org/prl/pdf/10.1103/PhysRevLett.115.043002>

[3] <http://qurope.eu/category/qics/10-quantum-computation/12-simulations/1210i-simulations-many-body-interactions>

[4] <http://qurope.eu/category/european-commission/h2020>

[5] <http://qurope.eu/category/qipc/qipc>

[6] <http://qurope.eu/category/projects/rysq>

[7] <http://qurope.eu/category/qics/00-quantum-information-science/05-cross-disciplinary-links/0510s-quantum-information-q>

[8] <http://qurope.eu/category/attribute/result>

[9] <http://qurope.eu/category/virtual-institute/quantum-simulation>

[10] <http://qurope.eu/category/qics/10-quantum-computation/15-implementations-quantum-optics/1>

510ry-rydberg-atoms