

Two-body interactions and decay of three-level Rydberg-dressed atoms

Mon, 2016-03-07 12:17 - [Shannon Whitlock](#) [1] **Date:** 2016-03-07

Author(s):

S. Helmrich, A. Arias, N. Pehoviak and S. Whitlock

Reference:

Journal of Physics B: Atomic, Molecular and Optical Physics 49, 03LT02 (2016)

URL:

<http://dx.doi.org/10.1088/0953-4075/49/3/03LT02> [2]

We theoretically analyze the interactions and decay rates for atoms dressed by multiple laser fields to strongly interacting Rydberg states using a quantum master equation approach. In this framework a comparison of two-level and three-level Rydberg-dressing schemes is presented. We identify a resonant enhancement of the three-level dressed interaction strength which originates from cooperative multiphoton couplings as well as small distance dependent decay rates. In this regime the soft-core shape of the potential is independent of the sign of the bare Rydberg-Rydberg interaction, while its sign can be repulsive or attractive depending on the intermediate state detuning. As a consequence, near-resonant Rydberg dressing in three-level atomic systems may enable the realization of laser driven quantum fluids with long-range and anisotropic interactions and with controllable dissipation.

- [RySQ](#) [3]
- [Result](#) [4]
- [15.10.Ry Rydberg atoms](#) [5]

Source URL:

<http://qurope.eu/db/publications/two-body-interactions-and-decay-three-level-rydberg-dressed-atoms>

Links:

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

[2] <http://dx.doi.org/10.1088/0953-4075/49/3/03LT02>

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

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

[5] <http://qurope.eu/category/qics/10-quantum-computation/15-implementations-quantum-optics/15-10ry-rydberg-atoms>