

# ARC: An open-source library for calculating properties of alkali Rydberg atoms

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**Reference:**

arXiv:1612.05529v1

**URL:**

<https://arxiv.org/abs/1612.05529> [2]

We present an object-oriented Python library for computation of properties of highly-excited Rydberg states of alkali atoms. These include single-body effects such as dipole matrix elements, excited-state lifetimes (radiative and black-body limited) and Stark maps of atoms in external electric fields, as well as two-atom interaction potentials accounting for dipole and quadrupole coupling effects valid at both long and short range for arbitrary alignment of the atomic dipoles. The package is cross-referenced to precise measurements of atomic energy levels and features extensive documentation to facilitate rapid upgrade or expansion by users. This library has direct application in the field of quantum information and quantum optics which exploit the strong Rydberg dipolar interactions for two-qubit gates, robust atom-light interfaces and simulating quantum many-body physics, as well as the field of metrology using Rydberg atoms as precise microwave electrometers.

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