

Speaker: Rohan Srikumar, University of Hamburg
Title: Ultralong-range Rydberg molecules: a quantum mechanical toolbox
Date: Wednesday, April 29, 11:00 am (s.t.).
Place: Seminar room 915

Abstract: Ultralong-range Rydberg molecules: a quantum mechanical toolbox

Ultralong-range Rydberg molecules are a peculiar class of ultracold bound states, wherein the underlying binding mechanism is the quantum scattering of a ground-state atom with a Rydberg electron. Consequently, a high-precision spectroscopic study of these molecules reveal the spin-structure, and scattering phase-shifts of the electron-atom scattering problem in extremely low energies, typically inaccessible to free electrons. We exploit the predominant S-wave nature and the deep potential energy structure of the trilobite molecule, to directly access the electron-atom scattering channel and extract the corresponding scattering lengths with great sensitivity.

Moreover, the highly oscillatory potential energy structure, and the low level-spacing of these molecules support rich dynamical phenomena and non-adiabatic effects. Our recent study has explored the possibility of wavepacket diffraction, vibronic resonances, and multi-channel dynamics in these diatomic systems, advertising their utility as a microscopic toolbox for quantum dynamics and scattering.