

KMD新年学术报告(2):

Strange Observations in a quantum degenerate plasma

时间: 2017年1月4日(周三)10:30

地点:频标楼一楼会议室

报告人: Chaired Professor Klaus Müller-Dethlefs 报告摘要:

A long life-time (>0.3 ms) quantum degenerate molecular Rydberg plasma is generated in the high-density region of a pulsed supersonic jet expansion by two-colour resonant excitation of nitric oxide (10%) in neon (5bar) into the high-n Rydberg threshold region close to the ionization limit.



For the plasma densities of < 10^{16} cm⁻³ reached in our experiments the electrons should become *quantum degenerate*, *i.e.* the electron de Broglie wavelength becomes larger than the Wigner-Seitz radius a relevant to describe the mean distance between the particles. Considering the well-known properties of pulsed supersonic jet expansions and textbook plasma physics, the Fermi energy $E_{\rm F} =$ $(3\pi^2)^{2/3}n_{\rm e}^{2/3}h^2/8\pi^2m_{\rm e}$ becomes bigger than the thermal energy kT.

The sharp resonances in the tof spectrum follow a very reproducible progression of mass to charge ratios and could originate from a plasma ion crystal of macroscopic size embedded in ultracold electrons.

