Hydrogen Wave Function

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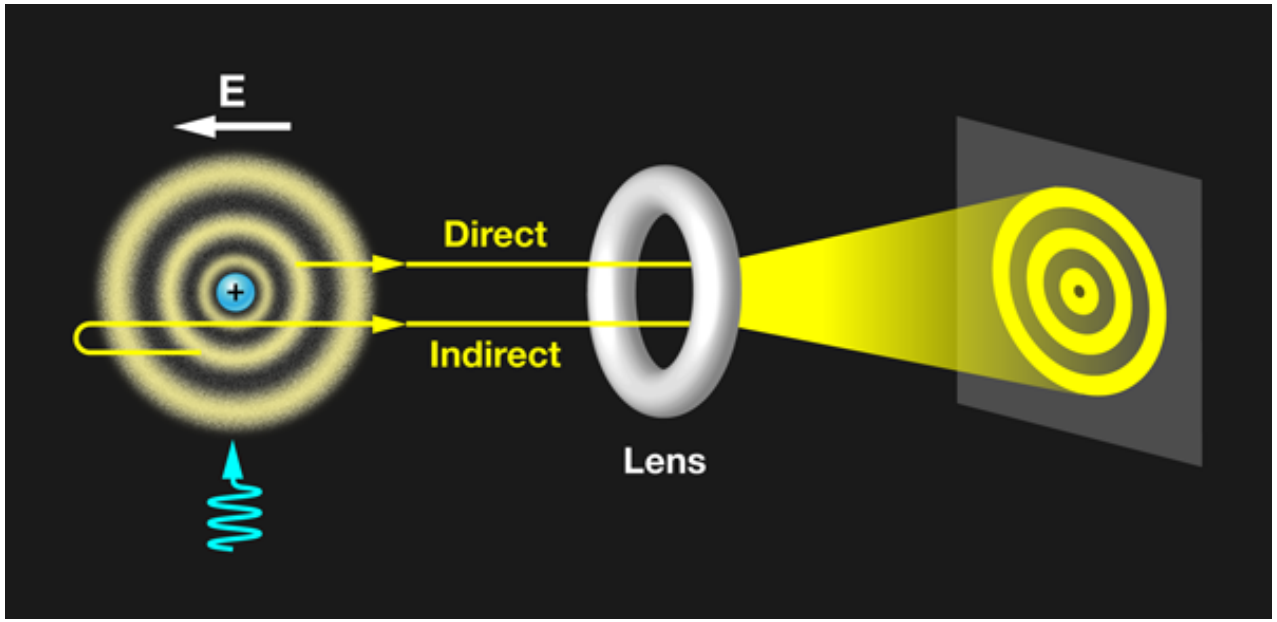
21.07.2021

Title

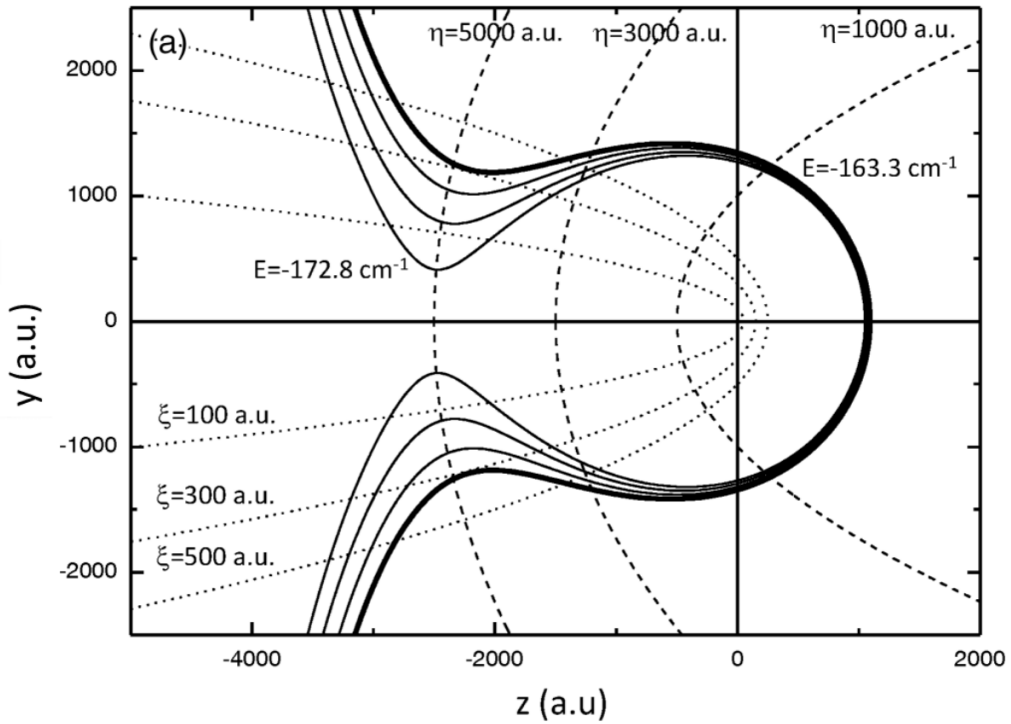
Possible applications:

- optical reflectometry;
- chaos radar;
- random numbers generation;
- signal encryption.

Idea of «quantum microscope»



Geometry of the problem

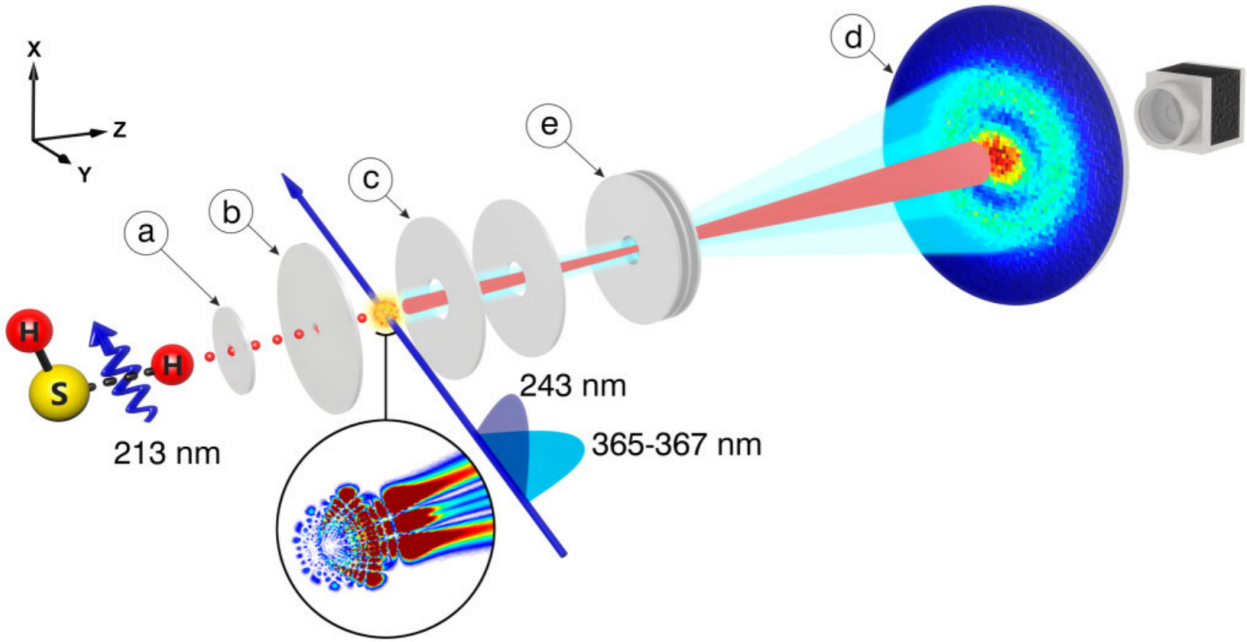


For z — displacement along the electric field. And r — electron-proton distance.

$$\eta = r - z$$
$$\xi = r + z$$

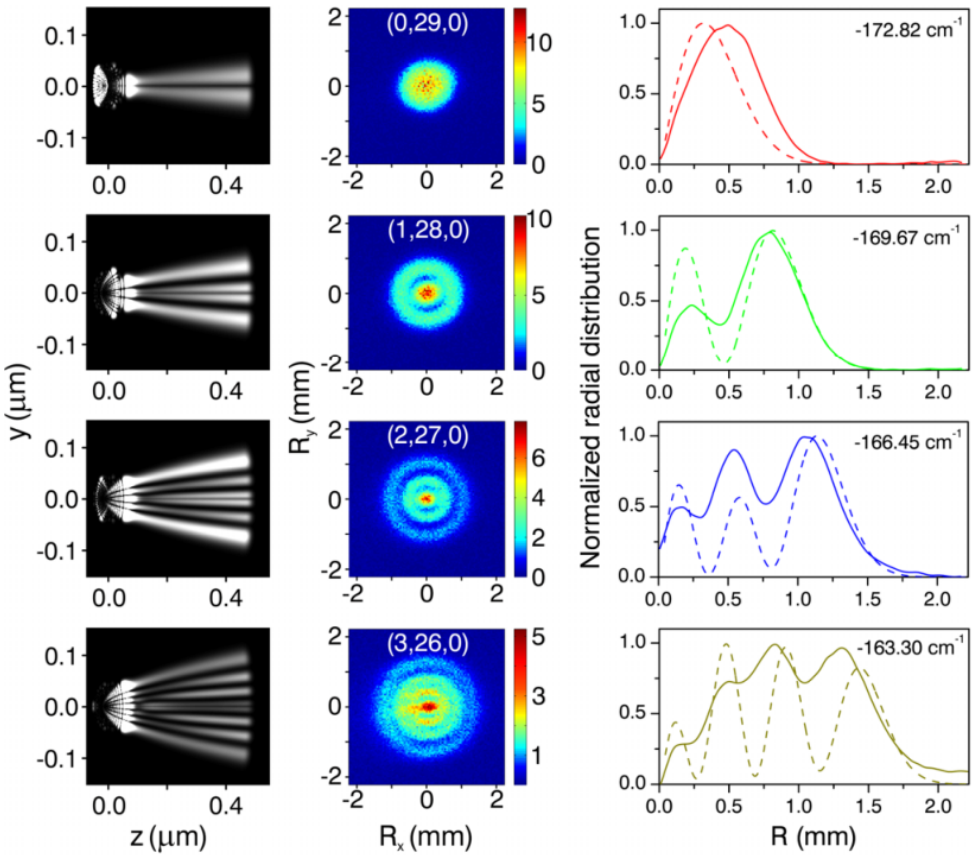
$$\Psi(\xi, \eta, \varphi) = \frac{1}{\sqrt{2\pi\eta\xi}} \chi_1(\xi)\chi_2(\eta)e^{im\varphi}$$

Preparation of state



Experimental observation

Experimental observation of the transverse nodal structure of four atomic hydrogen Stark states



States (n_1, n_2, m)
m — the magnetic quantum number.
n_1, n_2 — related to the principal quantum number as
$n = n_1 + n_2 + |m| + 1$

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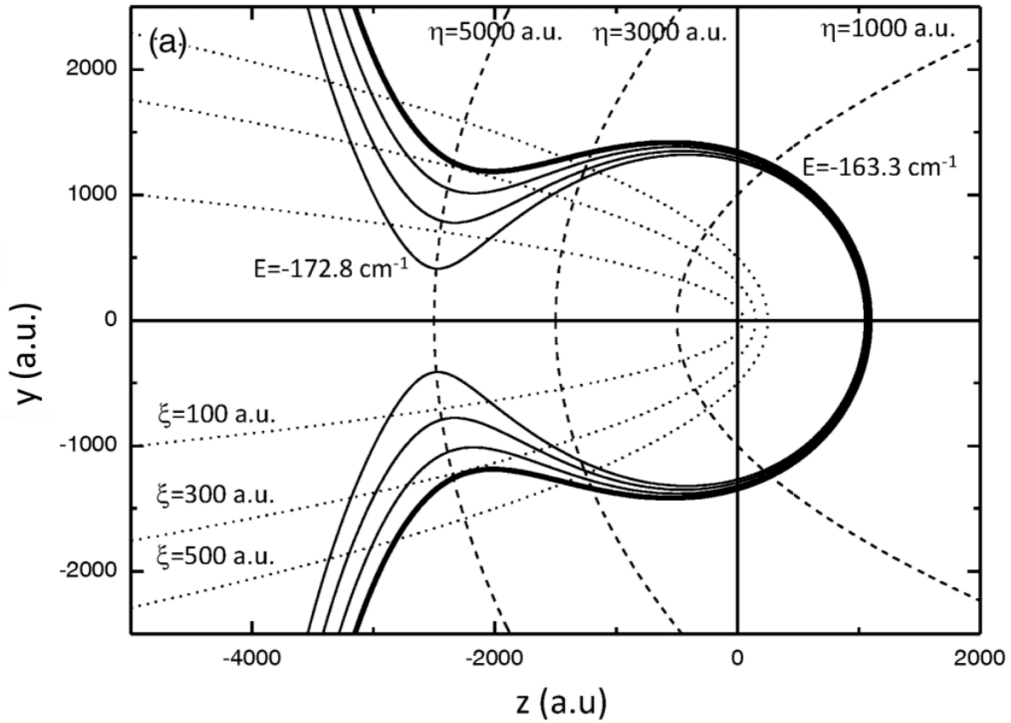

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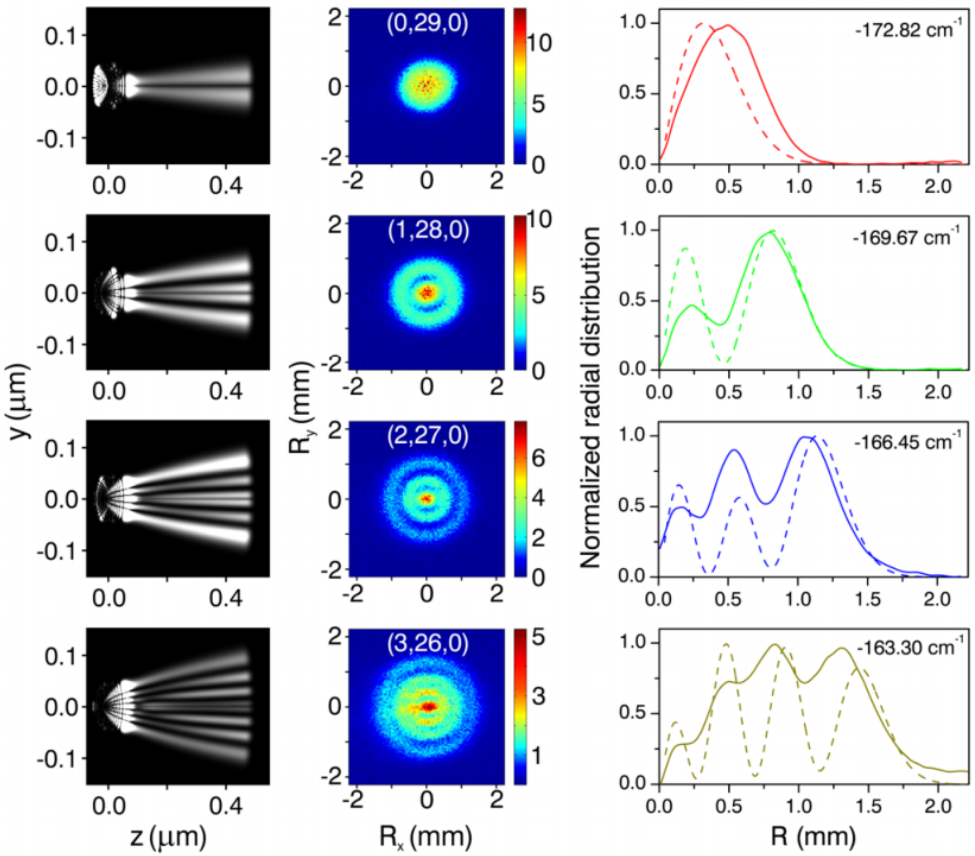

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