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Física Molecular

Curso

para estudantes de licenciatura, mestrado e pós-graduação

“Electron collisions with atoms and molecules”

5, 6 e 7 de Julho de 2022, das 14:00-15:30 anfiteatro da Biblioteca

Abstract.

In order to explore the natural phenomena surrounding us at the atomic and molecular levels, in general, a measurement of the kinetic energy or angular distribution of scattered, emitted electrons or produced ions in interactions between the electrons/photons and gaseous targets is one of the effective methods. Particularly, one electron accelerated by an external voltage of about 100 V shows the wave-nature in quantum theory, whose de Broglie wavelength becomes approximately same size as the atoms and molecules. When the wavelength of the incident wave becomes a same order of the target size, the wave interacts with the target more efficiently. This idea has been also extended to the electron microscopy technique more recently. Our group, therefore, has been observing many scattering phenomena in the collisions of the low energy electrons with gaseous targets quantitatively for a long time.

This course deals with the electron energy loss spectroscopy and cross section measurements as one example of the well-established experimental techniques. First, it introduces general topics of electron scatterings from atoms and molecules and experimental techniques to observe the electron scattering processes. Second, starting from wave nature of an electron, it will be extended to a quantum picture of electron scattering phenomena. Finally, comparison between experimental data measured in our laboratory and the theoretical calculations will be discussed.

Schedule

1st session (90 min. including Q and A session)

1. General topics of electron scattering
2. Definition of cross section
3. Experimental technique

2nd session (90 min. including Q and A session)

1. Wave nature of an electron
2. Potential scattering in the quantum world
3. Partial wave approximation in the electron scattering

3rd session (90 min. including Q and A session)

1. Electron energy loss spectra
2. Experimental cross sections
3. Comparison between experimental and theoretical data