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In the sommer semester 2011 I will offer a two-hour

# Introduction to the theory of atomic and molecular collisions (5708006).

Everybody interested in scattering theory and its applications to atomic and molecular collisions is welcome. To fix time and location we will meet on Friday, April 8 at 10am in the GSRP of the Institute of Physics.

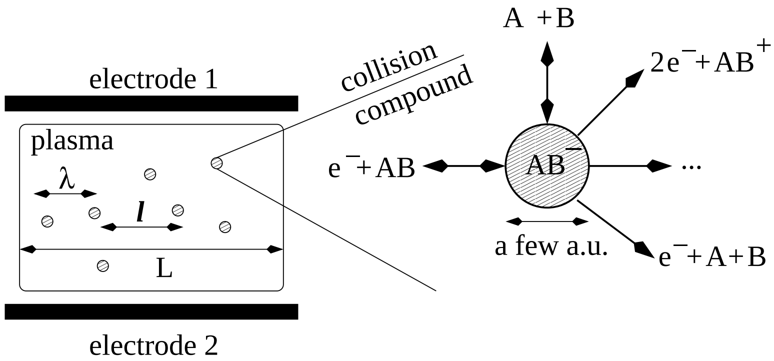
**Outline**

I. Motivation
1. Elementary processes in plasmas
2. Scattering cross section

II. Formal scattering theory
1. Elastic scattering
2. Inelastic and reactive scattering

III. Advanced concepts
1. Adiabatic approximation
2. Resonance scattering
3. Optical potential
4. Break-up collisions

IV. Typical applications
1. Dissociative attachment
2. Charge exchange




**Literature**:
A multitude of books deals with scattering theory and its application to atomic and molecular collisions. My favorites at an intermediate level are:

- A. G. Sitenko, Scattering theory (Springer, 1991)
- B. A. Bransden, Atomic collision theory (Benjamin, 1983)
- G. F. Drukarev, Collisions of electrons with atoms and molecules (Plenum Press, 1987)

A very good book devoting considerable space to semiclassical approximations which are mathematically rather charming is:

- M. S. Child, Molecular collision theory (Dover Publications, 1984)

gez. Franz X. Bronold

The modern atomic theory states that atoms of one element are the same, while atoms of different elements are different. What makes atoms of different elements different? The fundamental characteristic that all atoms of the same element share is the number of protons. All atoms of hydrogen have one and only one proton in the nucleus; all atoms of iron have 26 protons in the nucleus. This number of protons is so important to the identity of an atom that it is called the atomic number of the element.Â  Each element has its own atomic number, which is equal to the number of protons in its nucleus. Isotopes of an element contain different numbers of neutrons. Elements are represented by an atomic symbol. This introduction to the scattering theory of low energy (0.1 to 1.0 eV) atomic and molecular collisions provides a strong theoretical background, maintaining a balance between classical and quantum approaches. Addresses the four main branches of the subject - elastic, inelastic and reactive scattering, and electron excitation - all supported by computational techniques.