

Beam Emission Spectroscopy (BES)

Luigi Persico

Physical principles

When neutral particles enter in a plasma, they are subject to inelastic collisions with plasma's ions and electrons. The neutrals' electrons, which initially are in their ground state, can reach a higher energy level, E_2 and, when they decay to a lower energy state E_1 , they emit a photon with energy $E_\gamma = E_2 - E_1$, and wavelength $\lambda = \frac{hc}{E_\gamma}$.

In particular, of specific interest is the Balmer- α emission of the deuterium atom D_α , which corresponds to the transition between $n = 3$ and $n = 2$, and is characterized by an energy $E_{D_\alpha} = 1.89$ eV and a wavelength $\lambda_{D_\alpha} = 656.279$ nm.