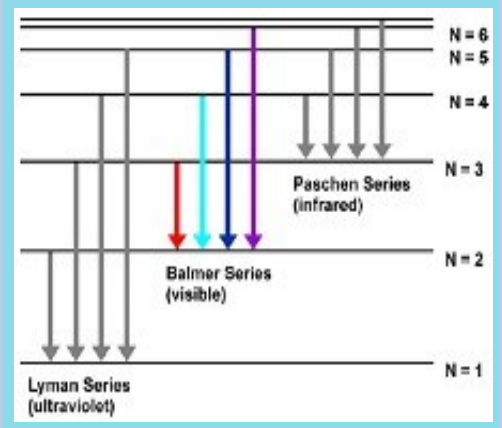
Construct, Conduct & Comprehend Physics Experiments

LEOK-70 Balmer Series of Hydrogen & Rydberg Constant

- *Stable aluminum rail for easy alignment*
- *Hydrogen-Deuterium lamp*
- *Detailed instructional manual*



Spectral lines of Hydrogen atom

The Balmer series is referred to as a set of discrete emission spectral lines of the Hydrogen atom. The visible Balmer series involves the electron transitions from the higher energy levels ($n \geq 3$) to the second energy level ($n = 2$) where$n$ is the principal quantum number of the electron.

The wavelengths of the Balmer series of the Hydrogen atom can be calculated from equation $1/\lambda = R\,(1/2^2\text{-}1/n^2)$, n=3, 4, 5, ..., where R is an empirical constant called the Rydberg constant (R=1.096776x10^7 m^{-1}).

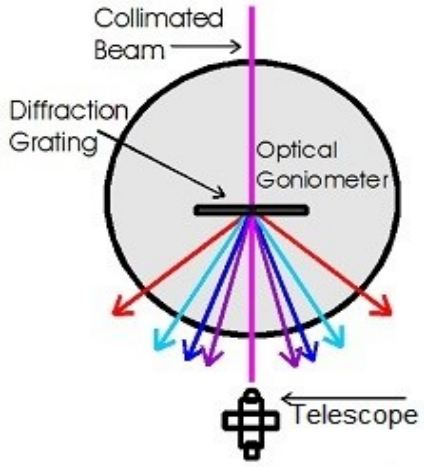
This apparatus uses a diffraction grating to disperse the collimated beam of a Hydrogen-Deuterium lamp and a digital protractor stage along with a telescope to measure the diffraction angles of the Balmer series lines. Once the wavelengths are determined, the experimental value of the Rydberg constant can be derived.

Specifications

Hydrogen-Deuterium Lamp	Wavelengths: 410, 434, 486, 656 nm
Digital Protractor	Resolution 0.1°
Condensing Lens	f = 50 mm
Collimating Lens	f = 100 mm
Transmissive Grating	600 lines/mm
Telescope	magnification 8 x; diameter of objective 21 mm w/ reference line inside
Optical Rail	Length: 74 cm; aluminum

Part List

Optical rail	1
Carrier	3
X-Translation carrier	1
Optical rotation stage with digital protractor	1
Telescope	1
Lens holder	2
Lens	2
Grating	1
Adjustable slit	1
Telescope holder (tilt adjustable)	1
Hydrogen-Deuterium lamp with power supply	1 set



Schematic of spectral dispersion

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