Háskóli Íslands
Raunvísindadeild
Eðlisfræði

Vor 2020

Frumeinda- og ljósfræði

Dæmablað 1

Skilafrestur 16. Janúar 2020 kl. 15:00

1. **Isotope shift** (10)

   The deuteron has approximately twice the mass of the proton. Calculate the difference in the wavelength of the Balmer-α line in hydrogen and deuterium.

2. **Electric field to remove an electron** (10)

   Estimate the electric field needed to pull an electron out of an atom in a time comparable to that for the electron to go around the nucleus.

3. **Hydrogen series** (10)

   (a) Using Balmer's generalized formula, show that a hydrogen series identified by the integer m of the lowest level occupies a frequency interval range given by

   $$\Delta\nu = cR_{\mathrm{H}}/(m+1)^2$$

   (b) What is the ratio of the range of the Lyman series to that of the Pfund series ?