With increasing quantum number the energy difference between adjacent levels in atoms.

Solution.

The energy levels of an electron around a nucleus:

$$E_n = -\frac{me^4Z^2}{8\varepsilon_0^2h^2n^2};$$

m - the rest mass of the electron;
e - the elementary charge;
Z - the atomic number;
ε_0 - the permittivity of free space;
h - the Planck constant;
n - the principal quantum number.

The energy difference between adjacent levels with quantum numbers $n+1$ and n:

$$\Delta E_{n+1,n} = E_{n+1} - E_n = -\frac{me^4Z^2}{8\varepsilon_0^2h^2}\left(\frac{1}{(n+1)^2} - \frac{1}{n^2}\right) =$$

$$= \frac{me^4Z^2}{8\varepsilon_0^2h^2}\left(\frac{1}{n^2} - \frac{1}{(n+1)^2}\right) = \frac{me^4Z^2}{8\varepsilon_0^2h^2}\left(\frac{2n+1}{n^4+2n^3+n^2}\right).$$

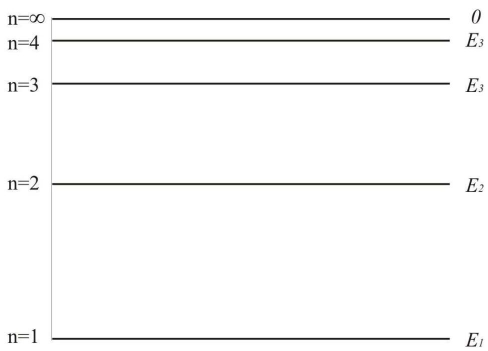
The energy difference between adjacent levels with quantum numbers $n+2$ and $n+1$:

$$\Delta E_{n+2,n+1} = E_{n+2} - E_{n+1} = -\frac{me^4Z^2}{8\varepsilon_0^2h^2}\left(\frac{1}{(n+2)^2} - \frac{1}{(n+1)^2}\right) =$$

$$= \frac{me^4Z^2}{8\varepsilon_0^2h^2}\left(\frac{1}{(n+1)^2} - \frac{1}{(n+2)^2}\right) = \frac{me^4Z^2}{8\varepsilon_0^2h^2}\left(\frac{2n+3}{n^4+6n^3+13n^2+12n+4}\right).$$

$\frac{2n+3}{n^4+6n^3+13n^2+12n+4} < \frac{2n+1}{n^4+2n^3+n^2}$, then $\Delta E_{n+2,n+1} < \Delta E_{n+1,n}$.

With increasing quantum number the energy difference between adjacent levels in atoms decreases.



Answer: With increasing quantum number the energy difference between adjacent levels in atoms decreases.