

# Object-Oriented Programming in C++

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PHYS3072 Assignment 1

Semester 2 2022-23

# Assignment 1

## The Bohr Atom

- The Bohr model allows the photon energies of electron transition to be calculated as :

$$E_{ij} = 13.6Z^2 \left[ \frac{1}{n_j^2} - \frac{1}{n_i^2} \right] \text{eV},$$

where  $Z$  is the atomic number,  $n_i$  and  $n_j$  are the principal quantum numbers (integers) for the initial and final energy states of the electron, respectively. Write a C++ program to calculate the energy for a transition. It should

- Ask the user to enter the atomic number, and initial and final quantum numbers, and then ask the user whether to print out the energy of the transition in J or eV
- Make use of C++-specific features described in the pre-lecture and lecture.
- The code asks whether to repeat (“y/n”), and stop if the answer is “n”.
- Check at each stage for incorrect inputs (either in format, or violating some physical conditions).

**Deadline: Friday 10th February 2023, 19.00.**

# Assignment 1

- You can test your code with the following example inputs.
- It also shows the response expected from your code.
- The error message should reflect your code.

1	2	1	J	number on output in J
y				repeat
1	1	2		error n_in<n_fin
3	5	1	e	number on output in eV
n				stop

# Instructions

- You may use the **skeleton code** provided on the webpage, but you are encouraged to write the program from scratch.
- You will need to compile and run your program using Visual Studio 2019.

# Marking Criteria

Marks will be awarded for a program that:

- Compiles and run successfully with requested input and output (1 mark).
- Makes use of at least two C++-specific features not in skeleton code (1 mark).
- Checks (and corrects) for bad input and formats precision of output (1 mark).
- Contains a separate function to return the energy of level (0.5 mark).
- The submission includes a screenshot of the code with the debugger running and a breakpoint set (0.5 marks).

You will loose marks:

- For not following the house style (-0.5 mark).
- Not submitting .cpp file(s) and .h files if used (-1 mark).
- A further penalty for late submission (after 7 pm on 10th February 2023).