
What causes the auroras ?

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Auroras are due to energetic electrons and protons (10 eV to 500 keV) flowing from the magnetosphere along the geomagnetic field lines and entering the atmosphere. These electrons and protons collide with neutral elements and ionise them at an altitude of about 100 km. Some gaseous elements in the atmosphere get stimulated and emit light while turning back into their initial state. This stimulation and emission result in the auroras seen at high latitudes.

To explain why atmospheric elements emit light during their return from stimulated state to the initial state, one can use Bohr's model of the atom (1915). With this simplified atom model one can explain the major characteristics of an atom, even though quantum mechanics gives a more reliable model.

In Bohr's model, neutrons and protons take up a central place called the core. The electrons orbit the core, attracted by the Coulombian force between the positively charged core and the negatively charged electrons. But only certain "electron paths" are allowed; the energy of the elements can only adopt particular discrete values. The electrons can change from one path into another by absorption (stimulation) or by emitting (falling back) the difference in energy between two paths allowed by the quantum mechanics. After colliding with high-energy elements, the atmospheric elements can absorb energy and jump to stimulated state. While falling back in the original state they emit light. The wavelength of this light corresponds to a photon with an energy equal to the energy difference between both electron paths.

