

# High Resolution Spectroscopy of Neodymium Atom Aiming Laser Isotope Separation

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Rare-earth elements play an important role in several areas of knowledge like physics, chemistry, engineering and medicine owing to their interesting luminescent, spectroscopic and magnetic properties. Among the rare earth elements, the IEAv is working on laser isotope separation of the neodymium atom, which can be used as a laser medium, as powerful permanent magnet and in the production of auxiliary nuclear batteries for satellites. Because this is an economically strategic issue, data involving laser separation process of rare earth elements are not available in the literature. This work will present neodymium spectroscopy in the spectral range between 575 nm and 600 nm. The experiments were performed using a sub-Doppler technique, combined with optogalvanic detection, known as intermodulated optogalvanic spectroscopy. Results of seven transitions from the ground state  $4f^4 6s^2 {}^5I_4$ , were investigated to determine the isotopic shifts of its natural isotopes. With the obtained results we can develop a process using the  ${}^{146}\text{Nd}$  isotope, to obtain the radioactive isotope  ${}^{147}\text{Pm}$ , which can be used to produce auxiliary nuclear batteries for satellites, thus contributing to enhance the development of the aerospace industry in Brazil.

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