CO2 laser system design for efficient boron isotopes separation

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Abstract

A cheap and efficient production of boron isotopes is important for providing further progress in nuclear engineering, semiconductor industry, and nuclear medicine. Motivated by this problem, we design the CO2 laser system to separate boron isotopes by the method of laser-assisted retardation of condensation. Values of the basic parameters for this system, such as an acceptable variation range of the laser operating pressure, mode locking laser system design, and estimation of an acceptable interval for the variation of laser intensity, related to the experimental ambiguity of BCl3 photo-absorption line positions, are found. In order to calculate them, a new formalism, which takes into account spectral shape of photo-absorption cross section and laser pulse emission spectrum, is developed. Conclusion that the three-lines is four times more efficient than single-line and eight times than two-lines excitation has been derived.

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