

Sudan University of Science & Technology
College of Graduate Studies

**Determination of the He-Ne and diode
laser beam parameters by ISO method
And compare it with the theoretical values**

تحديد معالمات شعاع ليزرى الهليوم نيون
والثنائي
الآيزو طريقة (ISO) ومقارنتها بالقيم النظرية
بتطبيق

**A Thesis Submitted for Partial Fulfillment for
the Degree of M.Sc. in Physics**

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بسم الله الرحمن الرحيم

قال الله تعالى:

﴿... وَمَا أُوتِيتُمْ مِّنَ الْعِلْمِ إِلَّا قَلِيلًا﴾

صدق الله العظيم

(الإسراء الآية) 85

Dedication

I dedicate this thesis

To my Parents

To my Family

Specially

To my Father

To My Mother

To my husband

To my Teachers

Acknowledgement

At first, I thank my God for helping me to complete this thesis. I thank with great appreciation, my supervisor Dr.Ahmed Hassan Sabah-Elkheir for his valuable guidance and support.

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الخلاصة

فى هذا البحث تم قياس معالم كل من شعاعى الهليوم نيون ليزردو الطول الموجى 632.8 نانومتر وبقدرة 1 مللى واط (صمم خصيصاً لتجارب فيزياء الليزر) وشعاع ليزر الثنائى التجارى دو الطول الموجى 651.6 نانومتر وبقدرة 1 مللى واط . وذلك بتطبيق طريقة المنظمة العالمية للقياس (الايزو) ومقارنتها بالقيم المحددة نظرياً لمثل هذه الليزرات . تم أولاً التأكد من الطول الموجى لليزر الثنائى التجارى ومن ثم استخدمت الأطوال الموجية فى حساب كل من عرض الشعاع والتفرق ومعامل الانتشار ومعامل الحد الزمنى للحيود .

برهنت الدراسة على ان تطبيق طريقة الايزو لتحديد معالم شعاع الليزر تعطى نتائج تتطابق الى حد كبير مع الحسابات النظرية لمعلمات شعاع ليزر الهليوم نيون والثنائى .

Abstract

In this study the parameters of the He-Ne laser beam with wavelength 632.8nm, and power 1 mW and commercial diode laser with wavelength 651.6nm, and power 1mW were measured, by applying the method of the International Standard Organization (ISO) system, and compared with the values that stated for the used lasers.

First, the wave length for He-Ne and diode laser was measured for assurance. The results obtained were used for calculation beam width, diffraction angle, propagation factor (K) and time limit diffraction factor (M^2).

The study proved that, applying the ISO method for determining of laser beam parameter gives a result that agreed to large extend with the theoretical calculation of the beam parameters.

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