AD-A193 993   COOPERATIVE EFFECTS AND INTRINSIC OPTICAL BISTABILITY   1/1
IN COLLECTIONS OF A..(U) TECHNION RESEARCH AND
DEVELOPMENT FOUNDATION LTD HAIFA (ISRAE..   Y BEN-ARYEH

UNCLASSIFIED   31 MAR 88 R/D-5859-PH-01 DAJA45-87-C-0040   F/G 7/4   NL

MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS-1963-A

AD-A193 993

SECOND INTERIM REPORT TO THE US ARMY

1. <u>Research Project</u>: "Cooperative Effects and Intrinsic Optical Bistability in Collections of Atoms", R&D # 5859-PH-01

2. <u>Principal Investigator</u>: Prof. Y. Ben-Aryeh

3. <u>Contractor</u>: Technion Research & Foundation LTD.

4. <u>Contract No</u>: DAJA 45-87-C-0040

5. Second Interim Periodic Report

6. <u>Report Period</u>: December 1st 1987 till March 31, 1988

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SCIENTIFIC WORK DONE DURING THE REPORTING PERIOD

1. Resonance Fluorescence Spectra of Driven Two, Two Level Atoms

The affect of the coherent dipole-dipole interactions on the resonance fluorescence spectra of two, two-level atoms, driven by coherent external field, has been investigated. The explicit dependence of the coherent dipole-dipole interactions on the distance between the two atoms has been taken into account in the theoretical treatment of the spectra. For the case of two, two-level atoms with a fixed distance smaller than a wavelength an analytical result for the resonance fluorescence line shape has been obtained and the result has been compared with previous works.

Our work on the resonance fluorescence spectra has been accepted for publication in the Special Issue on "Quantum and Nonlinear Optics of Single Atoms, Ions and Electrons" in the Journal of Quantum Electronics (IEEE). Three copies of this article are added to the Report.

2. The Langevin Equations for Intrinsic Bistability

We have studied the effects of the Langevin noise terms on intrinsic bistability, and especially analyzed the case for which the dephasing constant is large relative to that of the relaxation. Within this approximation one dimensional Ito differential equation for the inversion of population has been developed. The investigation of this random differential equation is under active research. We study now the tunneling process and the passage times between the two stable states in the intrinsic bistability.

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