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Tuning of nonlinear optical characteristics of Mathieu quantum dot by laser and electric field

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Abstract:

In this work, for the first time, the total refractive index (TRICs) and total absorption coefficients (TACs) of $\text{In}_x\text{Ga}_{1-x}\text{As}/\text{GaAs}$ Mathieu quantum dot (MQD) with hydrogenic impurity under the influence of the external electric field and laser field are probed. Within the framework of the Ehloltzky approximation, considering the Kramers-Henneberger transformation and dipole approximation, the time-dependent in the wave equation is transferred from the kinetic energy operator to the potential energy function. Then, the new Schrödinger equation for the MQD including the hydrogenic impurity under the external electric field and monochromatic linearly polarized laser radiation is solved numerically by employing the tridiagonal matrix method. In order to study the TRICs and TACs of MQD, the iterative method and compact-density-matrix formalism are employed. The influence of structural parameters as well as the external factors on the TRICs and TACs of the MQD is examined. The effects of external electric field, laser field, In-concentration, impurity atom position, the MQD depth and width parameters on the TRICs and TACs are investigated in detail, and functional ranges of relevant parameters are also determined for the purpose. In addition, the alternatives of these parameters to each other are also discussed. It is important for experimental research that all parameter values used are accessible.

Keywords

Keywords Plus: [IMPURITY](#); [ABSORPTION](#); [LUMINESCENCE](#); [SCATTERING](#); [DRIVEN](#); [STATES](#); [NOISE](#)

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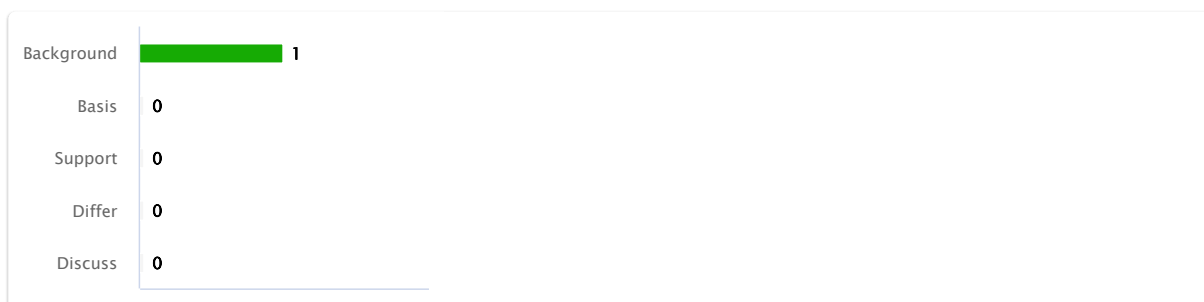
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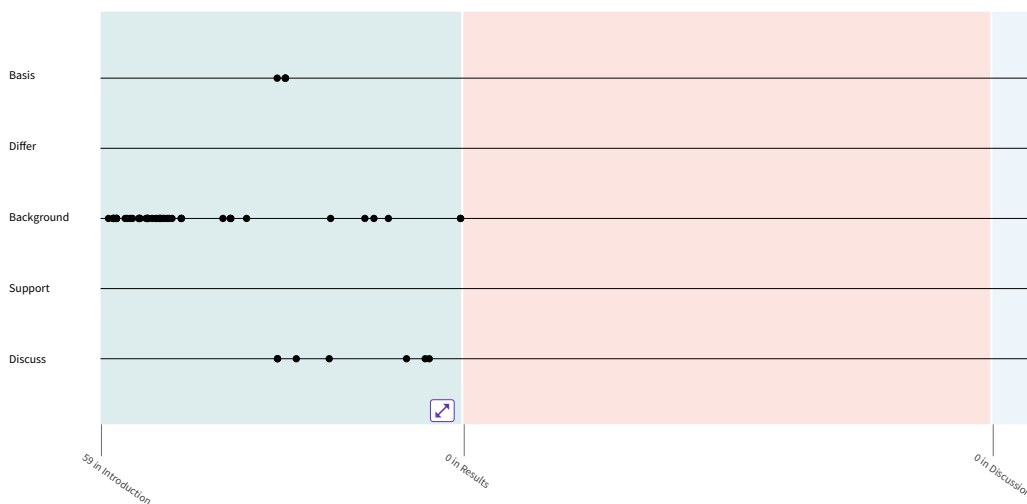
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