Rate equation description of quantum noise in nanolasers with few emitters - DTU Orbit (30/09/2019)

Rate equation description of quantum noise in nanolasers with few emitters

Rate equations for micro- and nanocavity lasers are formulated which take account of the finite number of emitters, Purcell effects as well as stochastic effects of spontaneous emission quantum noise. Analytical results are derived for the intensity noise and intensity correlation properties, $g(2)$, using a Langevin approach and are compared with simulations using a stochastic approach avoiding the mean-field approximation of the rate equations. Good agreement between the two approaches is found even for large values of the spontaneous emission beta-factor, i.e., for threshold-less lasers, as long as more than about ten emitters contribute to lasing. A large value of the beta-factor improves the noise properties.

General information
Publication status: Published
Organisations: Department of Photonics Engineering, Technical University of Denmark, Université Côte d'Azur
Corresponding author: Mørk, J.
Contributors: Mørk, J., Lippi, G. L.
Number of pages: 5
Publication date: 2018
Peer-reviewed: Yes

Publication information
Volume: 112
Issue number: 14
Article number: 141103
ISSN (Print): 0003-6951
Ratings:
BFI (2018): BFI-level 2
Scopus rating (2018): CiteScore 3.58 SJR 1.331 SNIP 1.212
Web of Science (2018): Impact factor 3.521
Web of Science (2018): Indexed yes
Original language: English
Electronic versions:
1.5022958.pdf
DOIs:
10.1063/1.5022958
Source: FindIt
Source ID: 2398491511
Research output: Contribution to journal → Journal article – Annual report year: 2018 → Research → peer-review