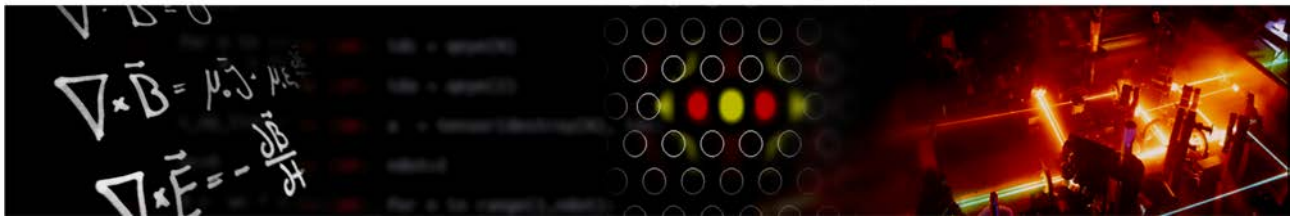

# B.Sc or M.Sc. project

## Stochastic modelling of nanolasers

For applications in integrated photonics it is important to develop ultra-small lasers that can generate coherent light with small intensity and phase noise. As the lasers become smaller and smaller, reaching into the nanoscale, one faces the problem that spontaneous emission quantum noise becomes increasingly important and it is required to understand the physics of the nanolasers in this regime.

At DTU Fotonik we perform experimental and theoretical research on photonic crystal nanolasers; the lasers are fabricated in our cleanroom and we experimentally characterize them in our femtosecond laboratory. The purpose of this project is to develop and analyze a theoretical model of quantum noise in nanolasers and to use the model to get fundamental insight into the physics of such nanolasers. Furthermore, the model will be used to analyze different types of laser structures, with the purpose of guiding experimental work.

The model will be based on stochastic differential equations and it is important that the student has an interest in mathematics, computer simulations, and laser physics.

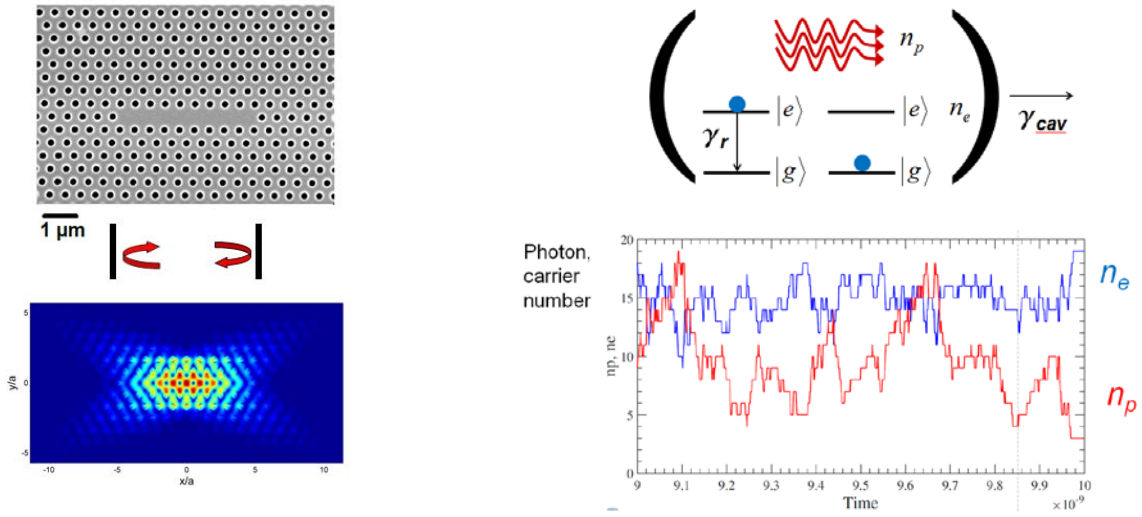


**Figure**: Illustration of photonic crystal nanolaser and example of the temporal evolution of the number of photons and excited quantum dots in the laser cavity.

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**References:**

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