

Optical probing of the Coulomb interactions of an electrically pumped polariton condensate

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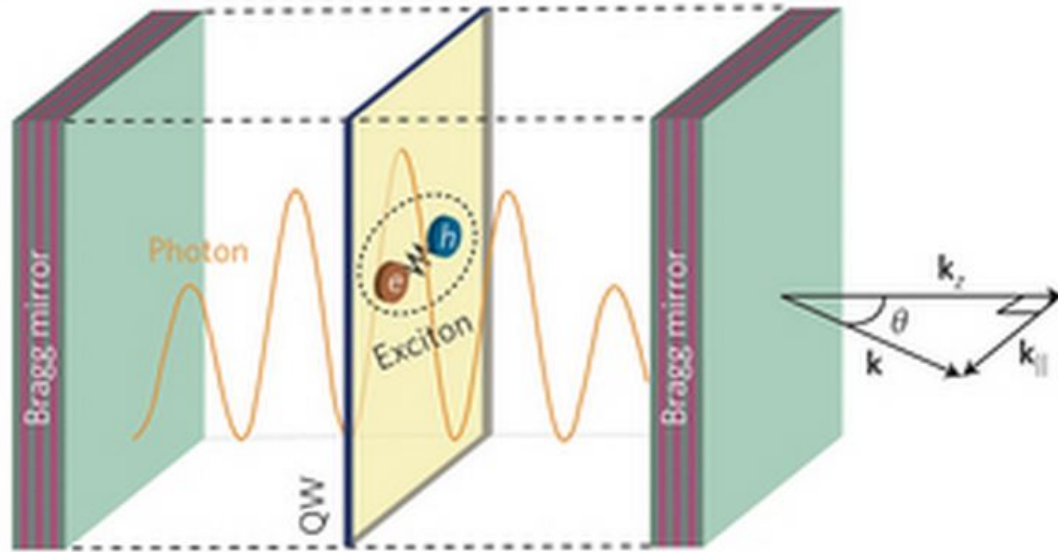
With M.Klaas, M.Amthor, S.Klembt, L.Worschech, C.Schneider and S. Höfling

Universität Würzburg, Germany

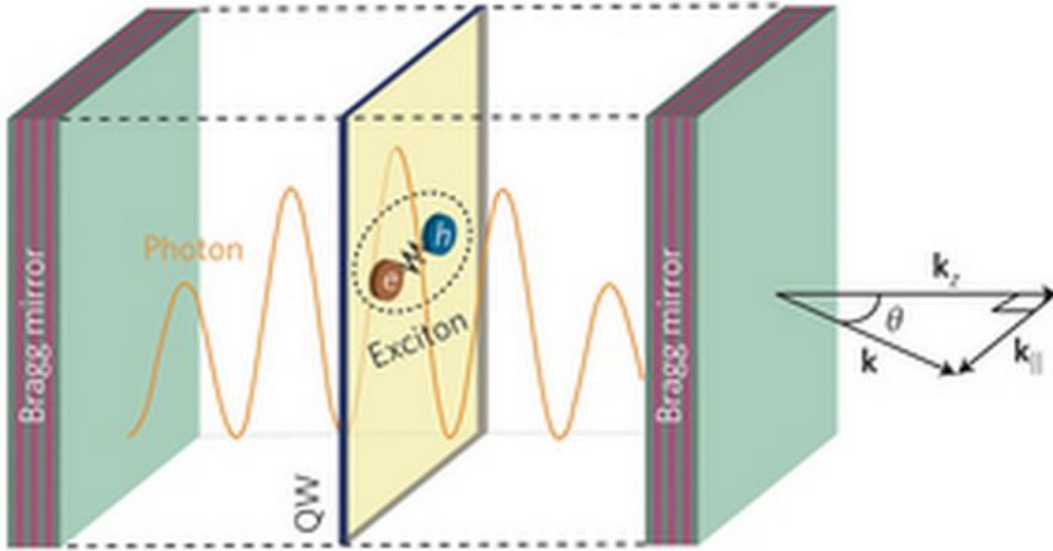
Outline

- Exciton Polaritons
- Polariton Condensatation
 - Optically Induced
 - Electrically Induced
- Summary

Exciton-Polariton

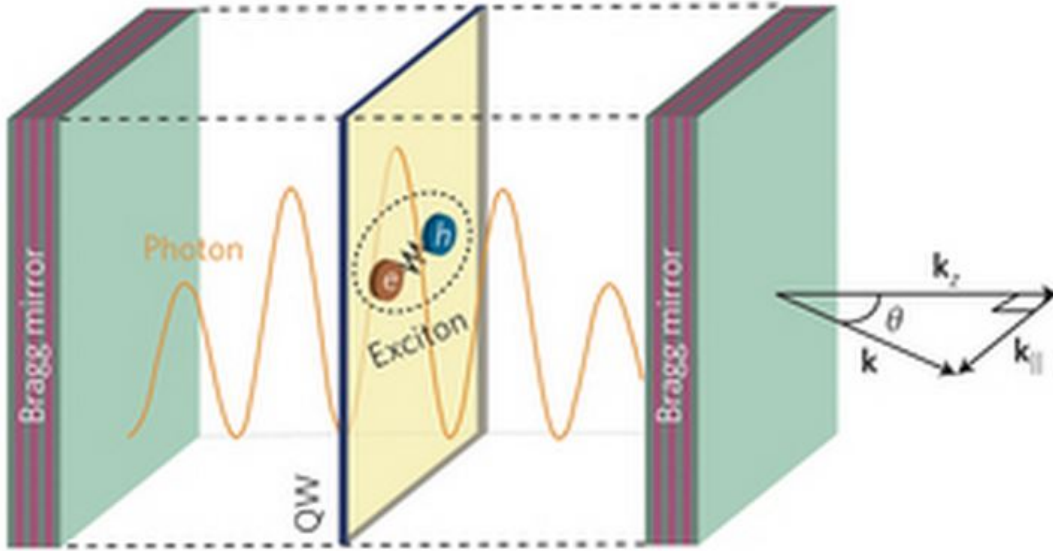


Exciton-Polariton



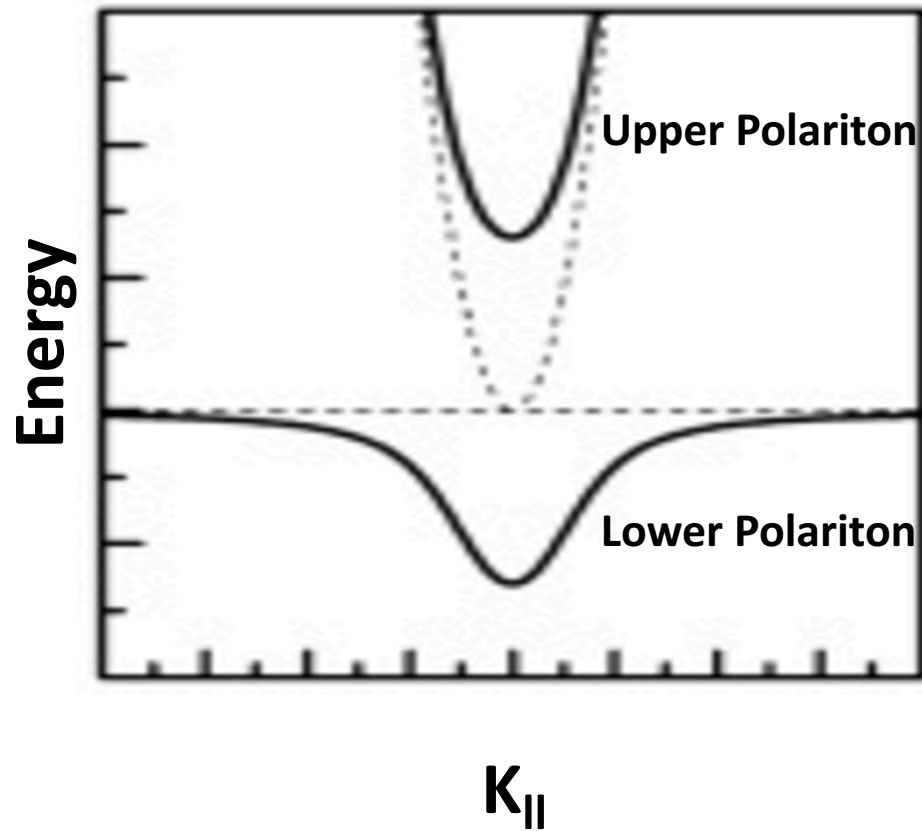
- **Bosons**
- **Low mass**
- **Short life time**
- **Excitonic component**

Exciton-Polariton



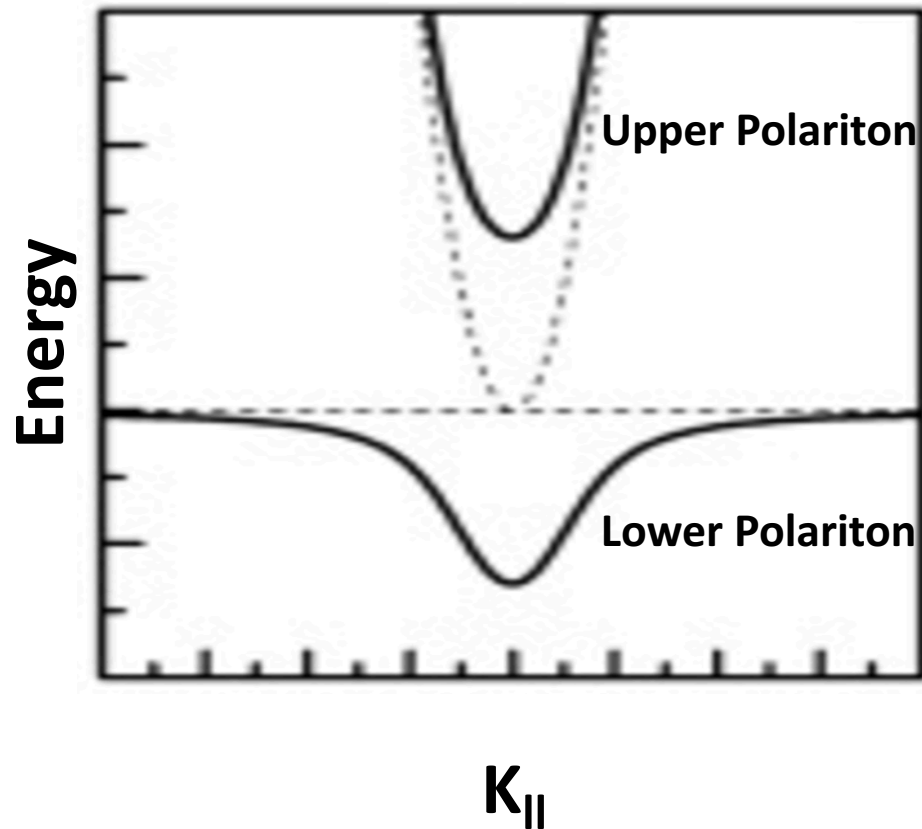
- Bosons
- Low mass $\longrightarrow$ **BEC**
- Short life time
- Excitonic component

Exciton-Polariton Condensation



- Bosons
- Low mass $\rightarrow$ BEC

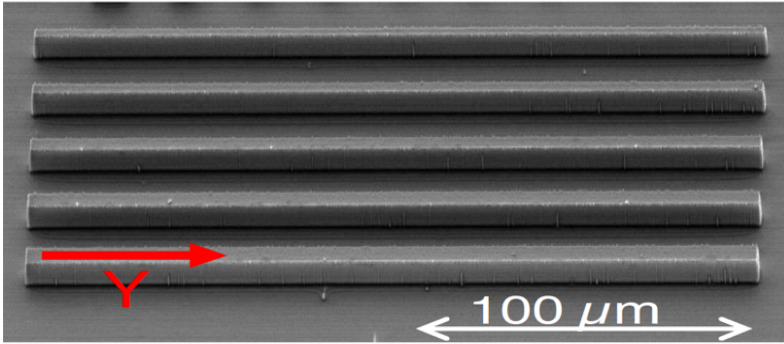
Exciton-Polariton Condensation



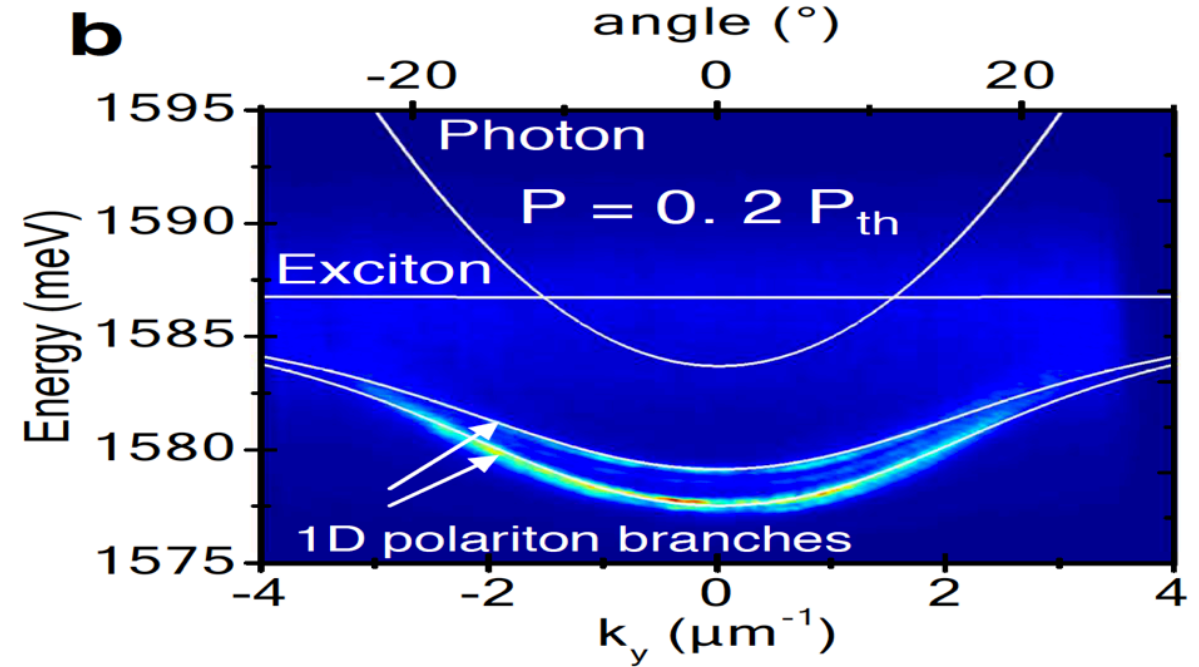
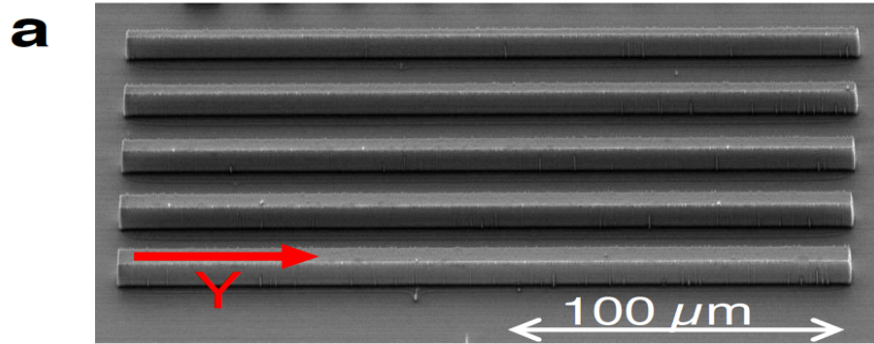
- Out of equilibrium system
- High exciton density in the reservoir

Polariton Condensation in 1D

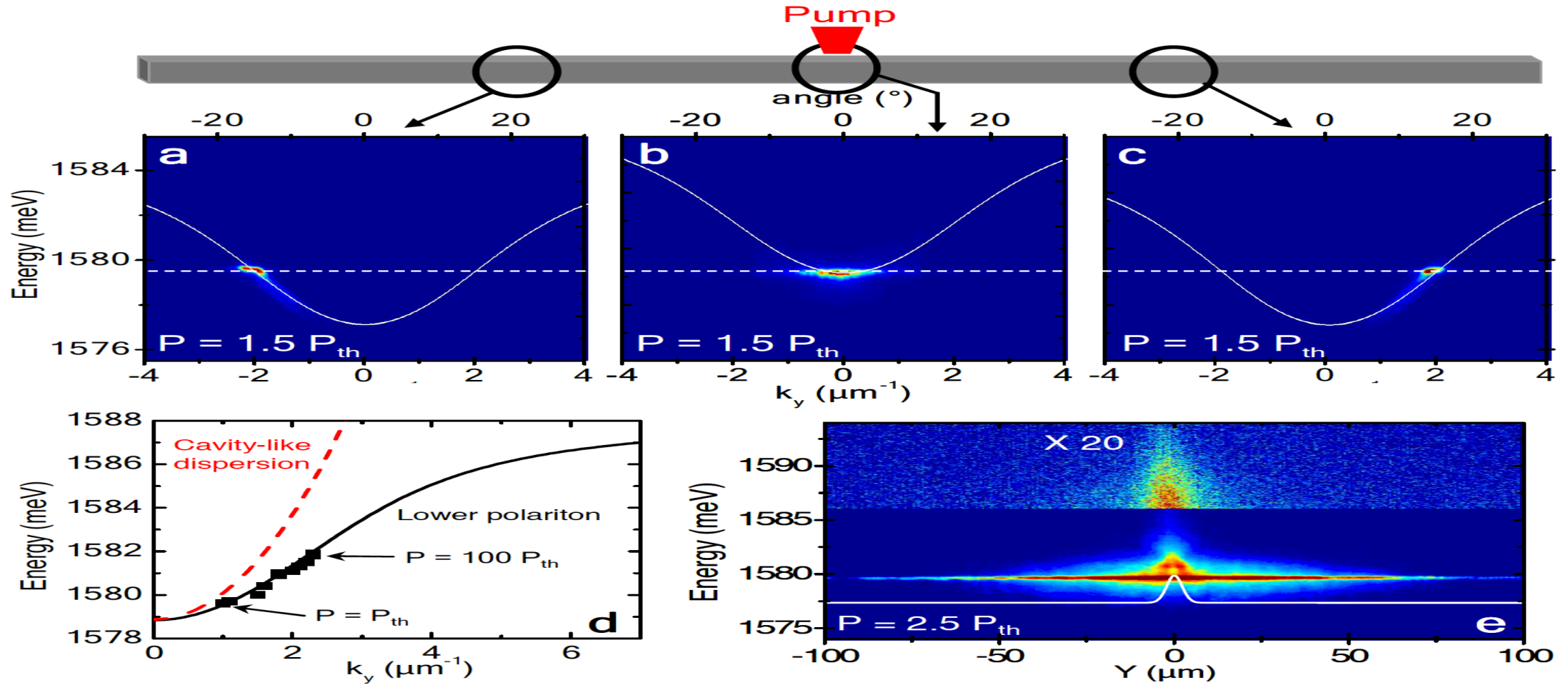
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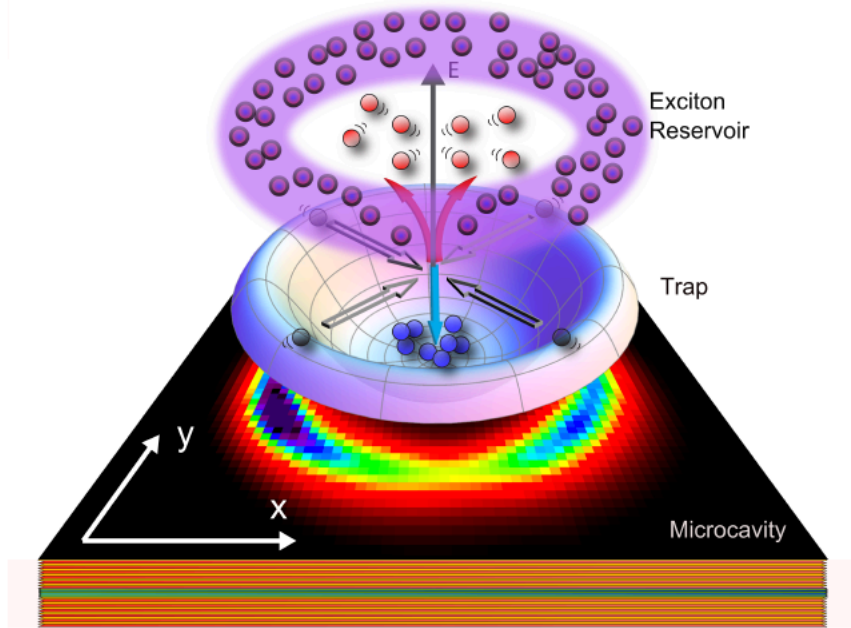
Polariton Condensation in 1D



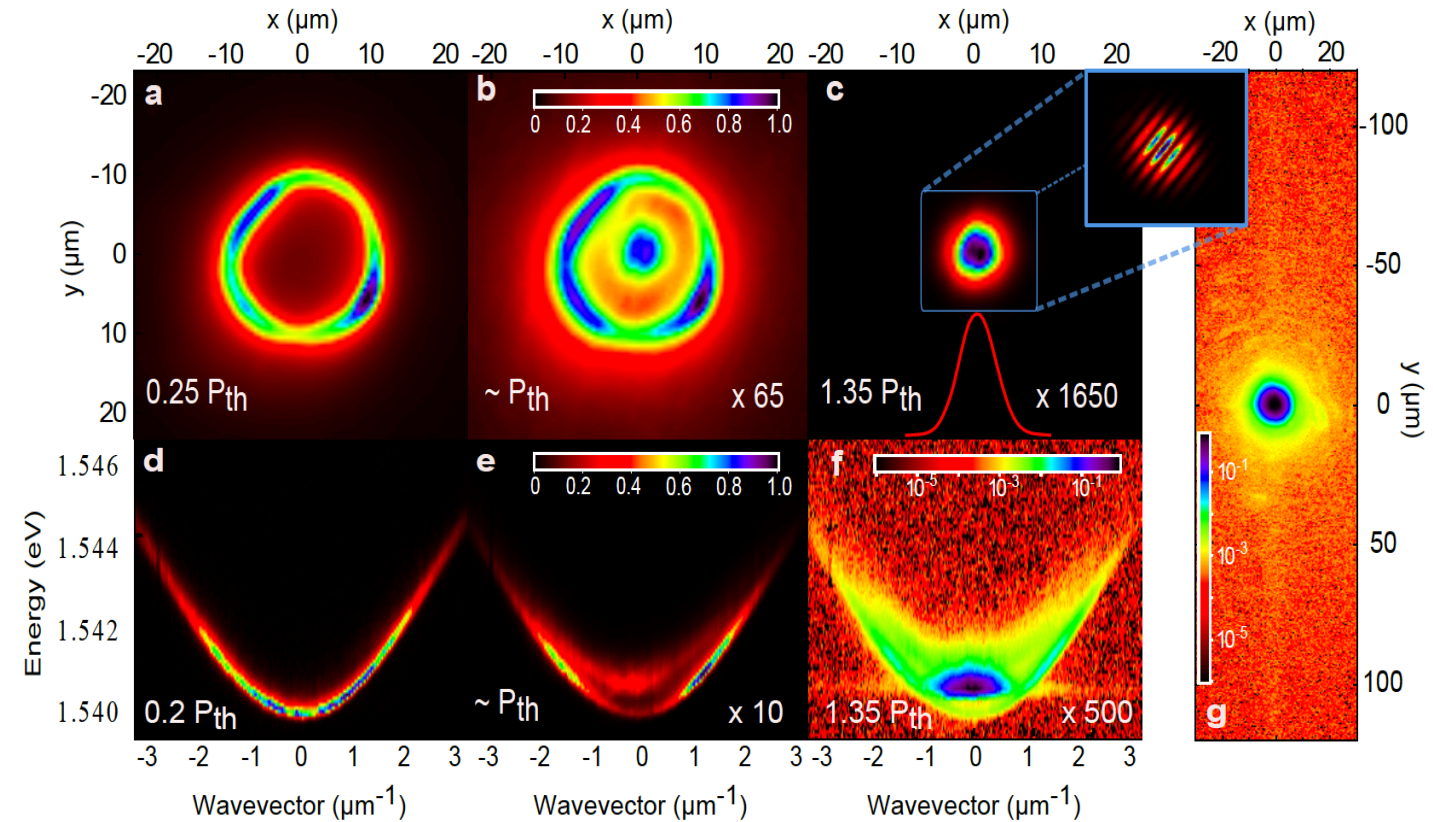
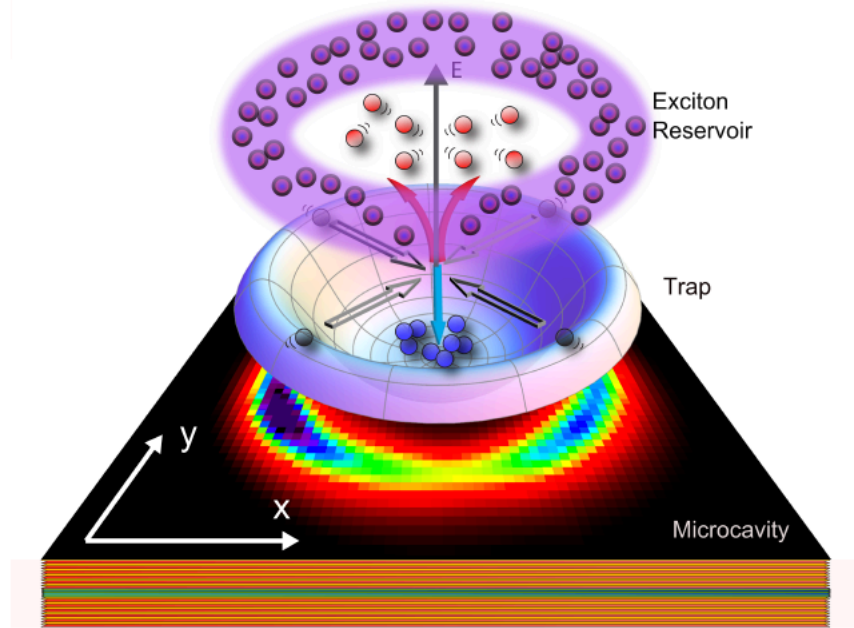
Polariton Condensation in 1D



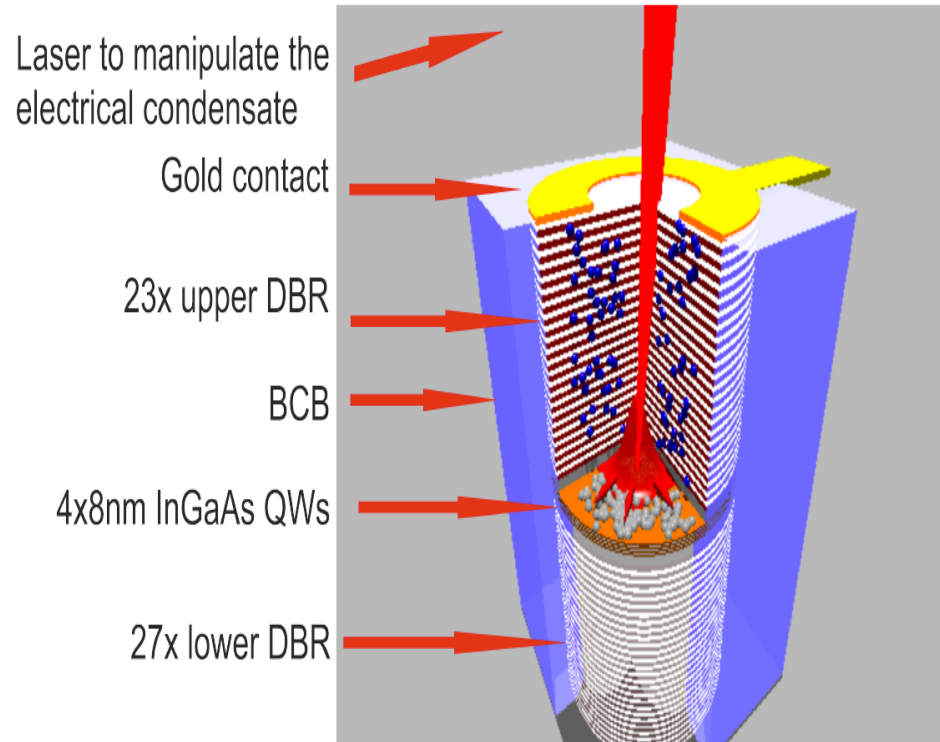
Polariton Condensation in an optically induced 2D potential



Polariton Condensation in an optically induced 2D potential



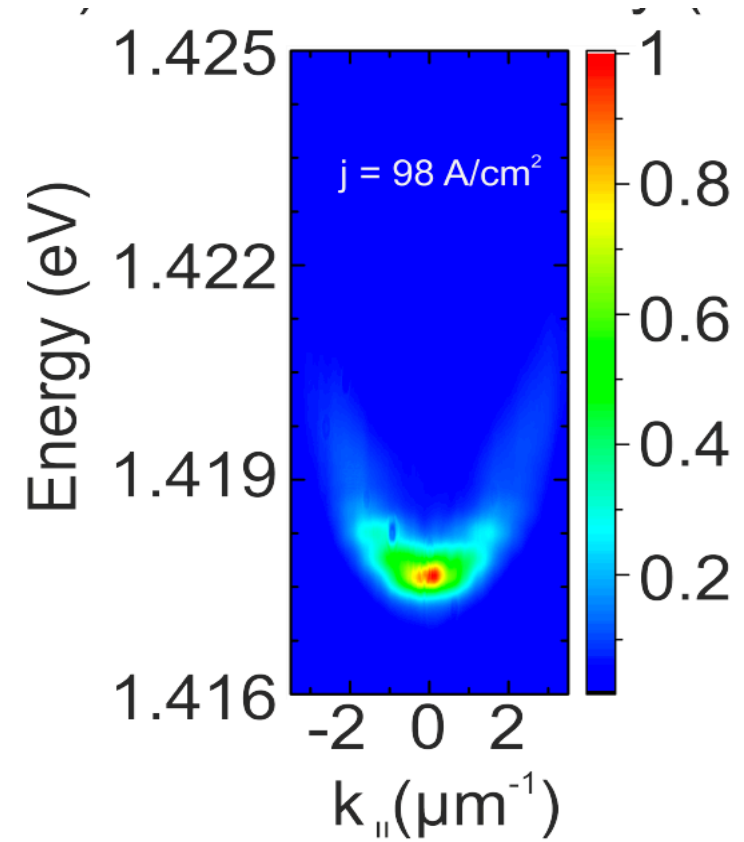
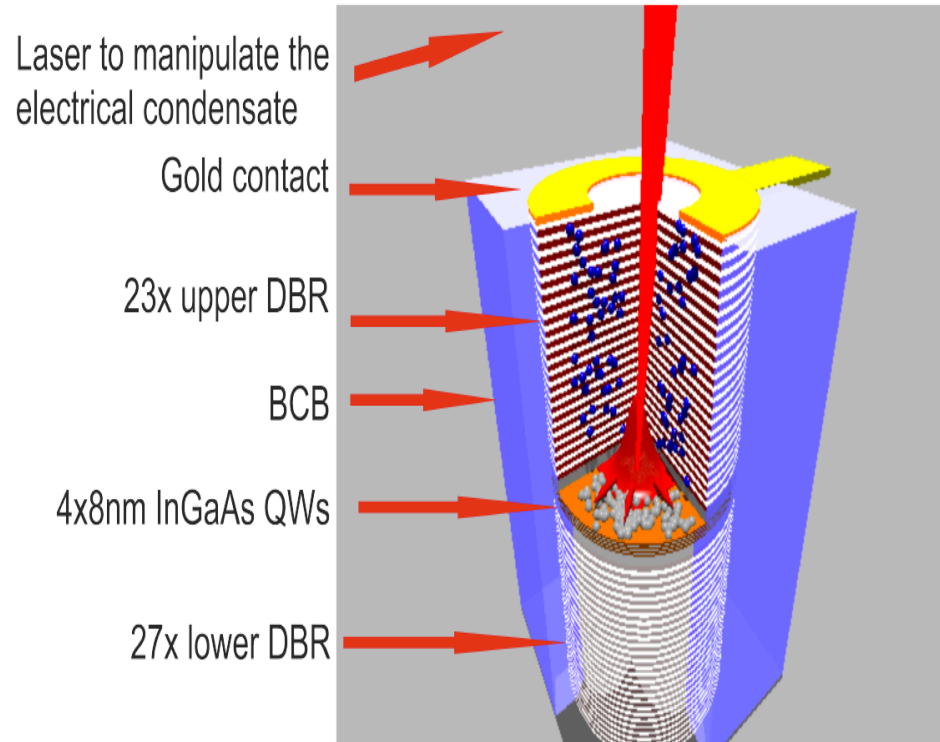
Experiment



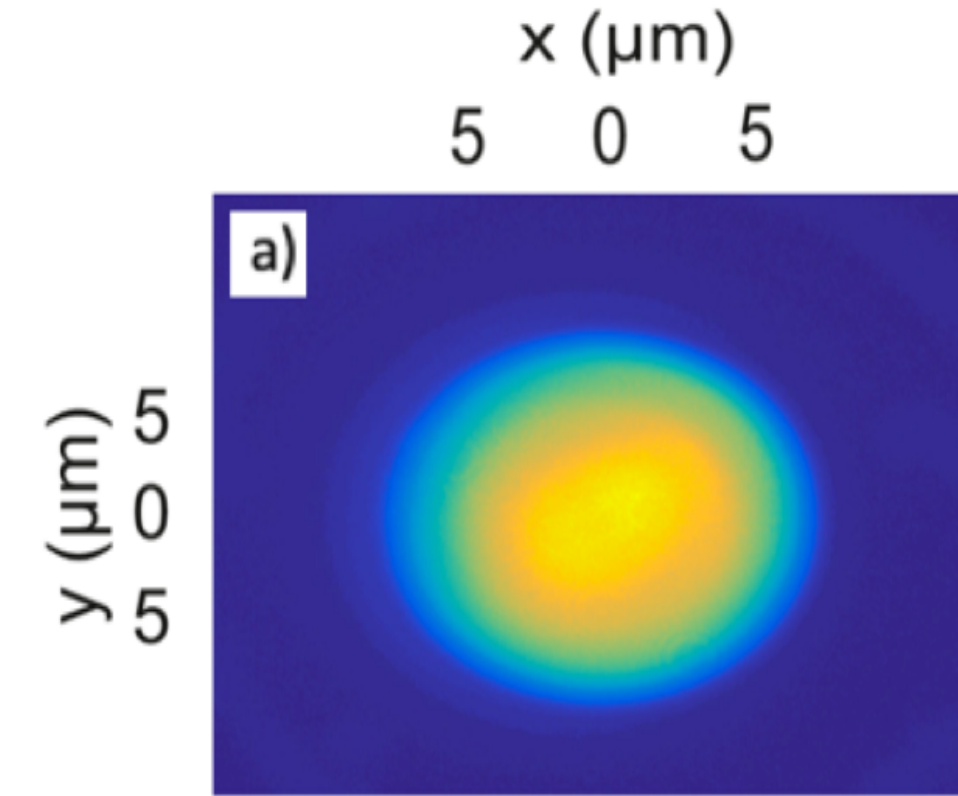
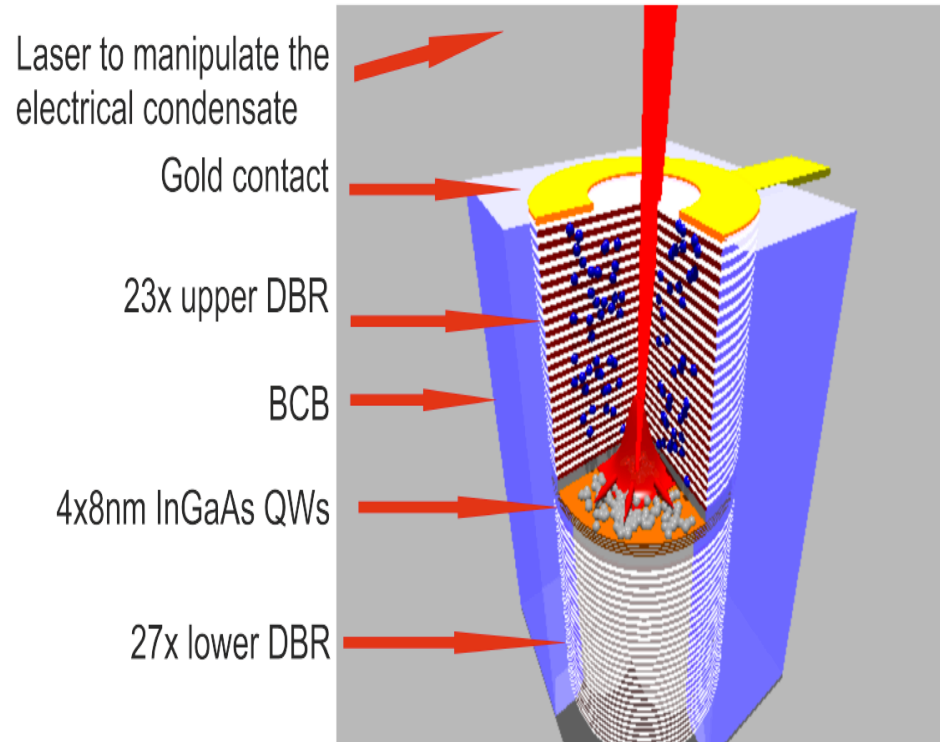
Schneider, Christian, et al. *Nature* 497.7449 (2013): 348-352.

M.Klaas, et al., *Appl. Phys. Lett.* **110**, 151103 (2017)

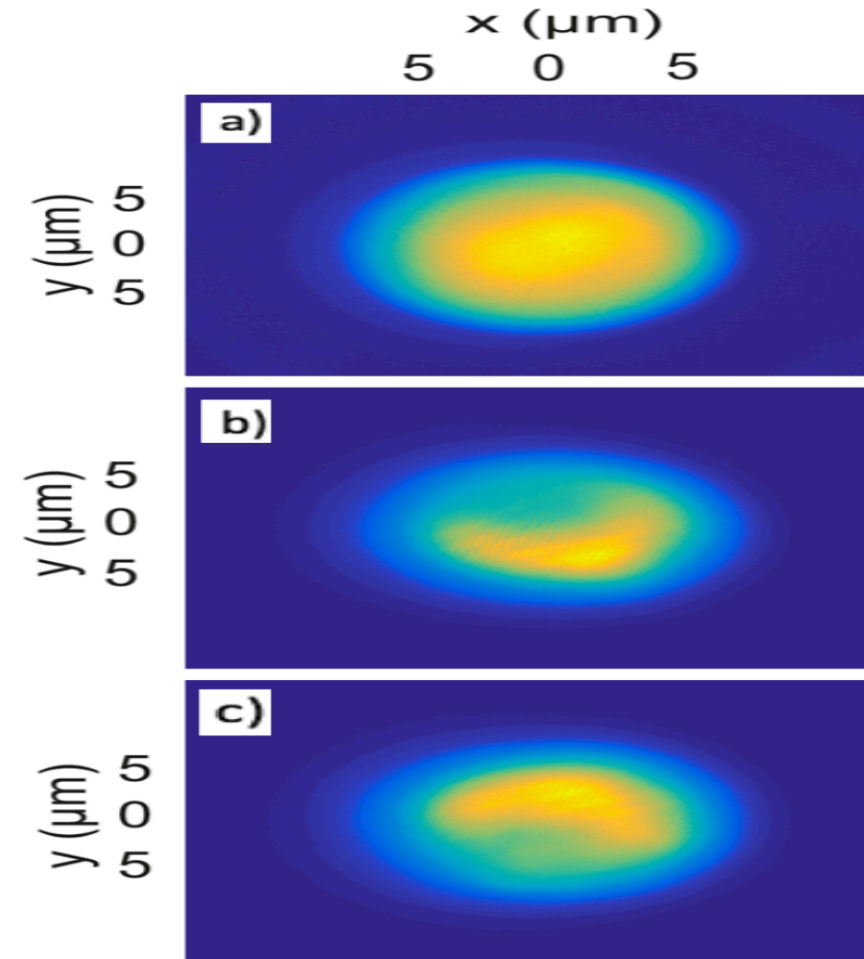
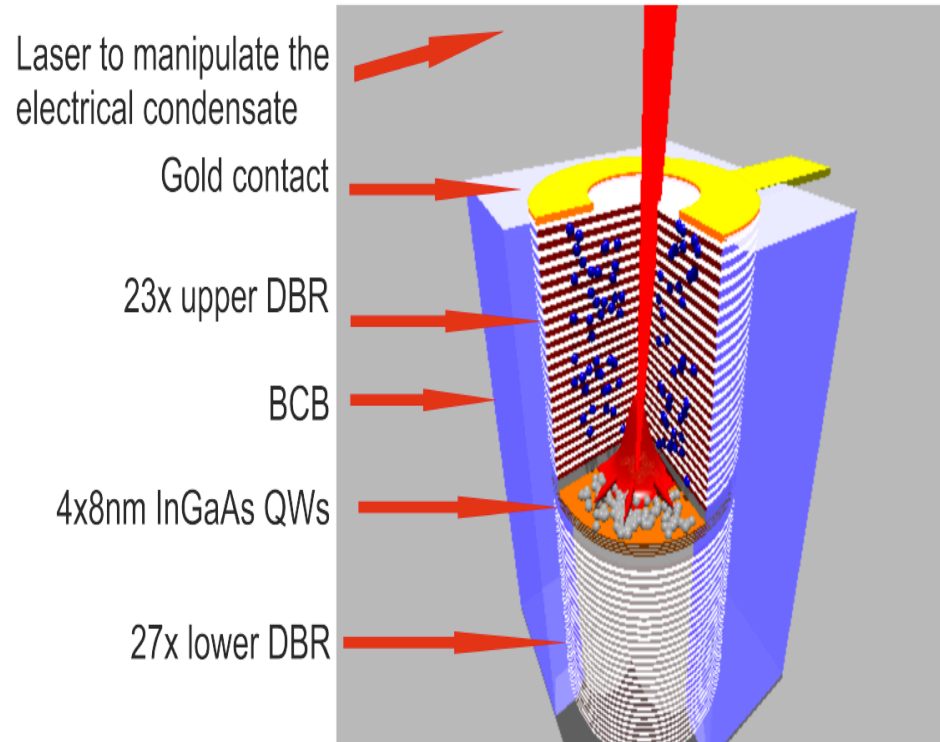
Experiment & Results



Experiment & Results



Experiment & Results



Polariton Wave Function

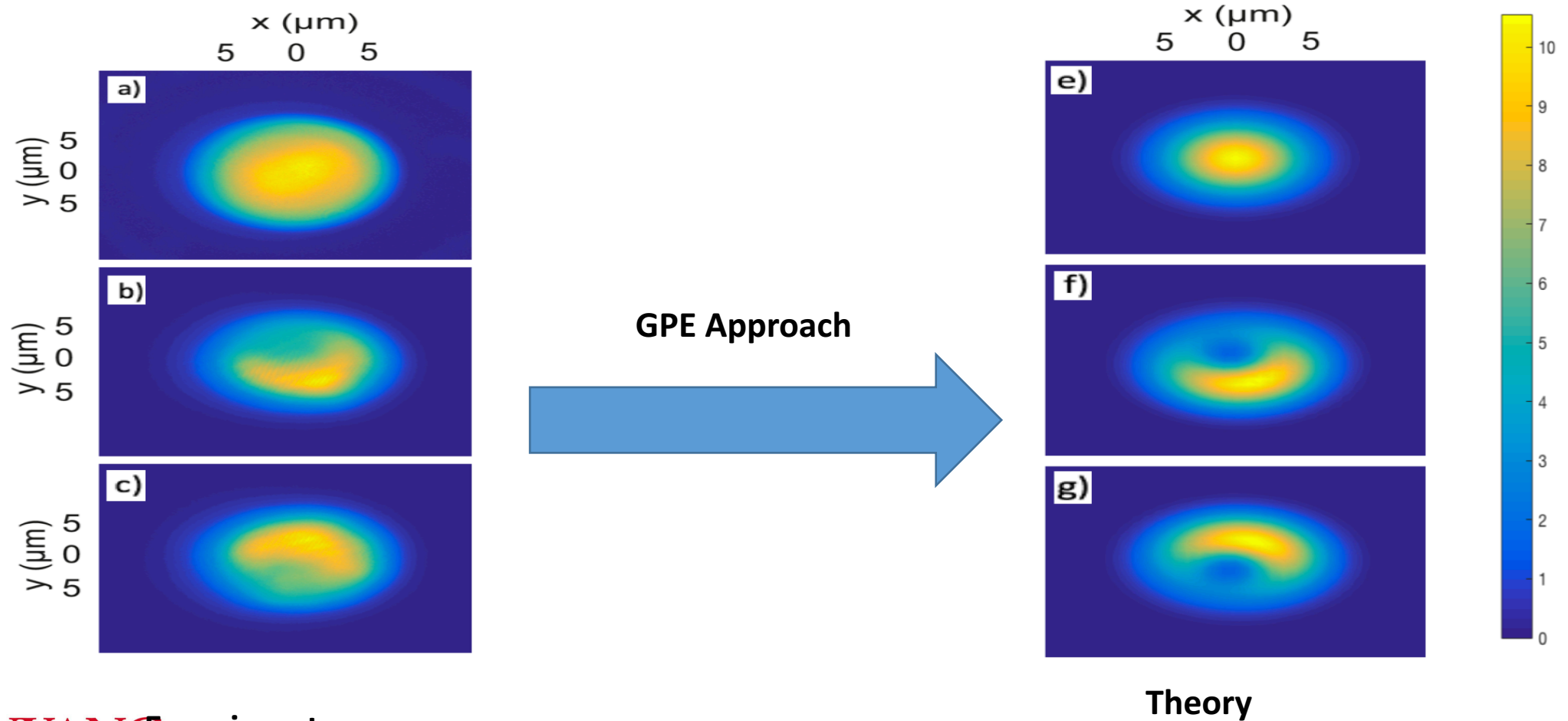
GPE:

Kinetic Energy Interactions with the excitonic reservoir Decay

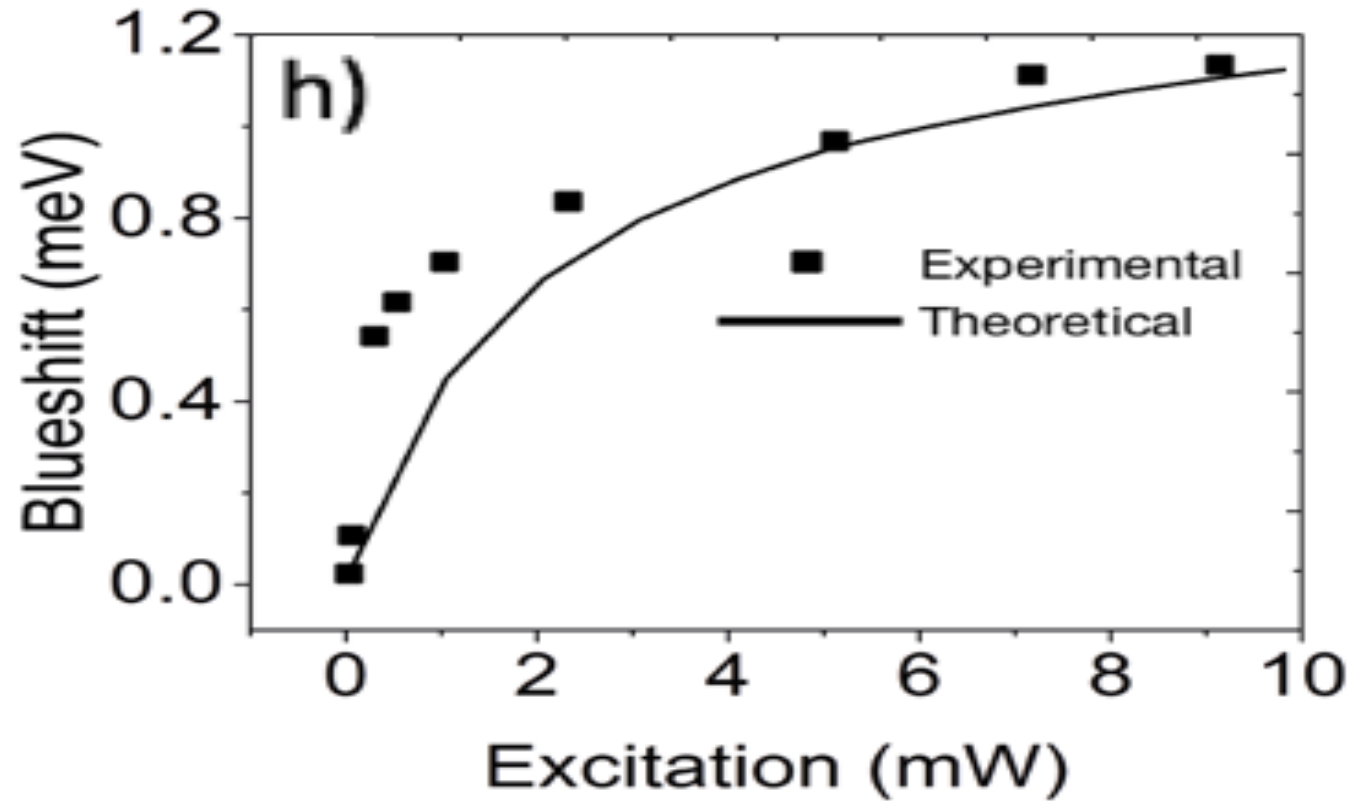
$$E_n \psi_n(x) = \left[-\frac{\hbar^2 \nabla^2}{2m} + \left(g_R + \frac{i}{2} \right) P(x) + g_c |\Psi(x)|^2 - \frac{i\Gamma}{2} \right] \psi_n(x)$$

Pumping term Interaction within the condensate

Results:



Blue Shift:



Thank You for your attention

