Dipolariton Propagation in a van der Waals TMDC with Ψ-shaped channel guides and buffered channel branches

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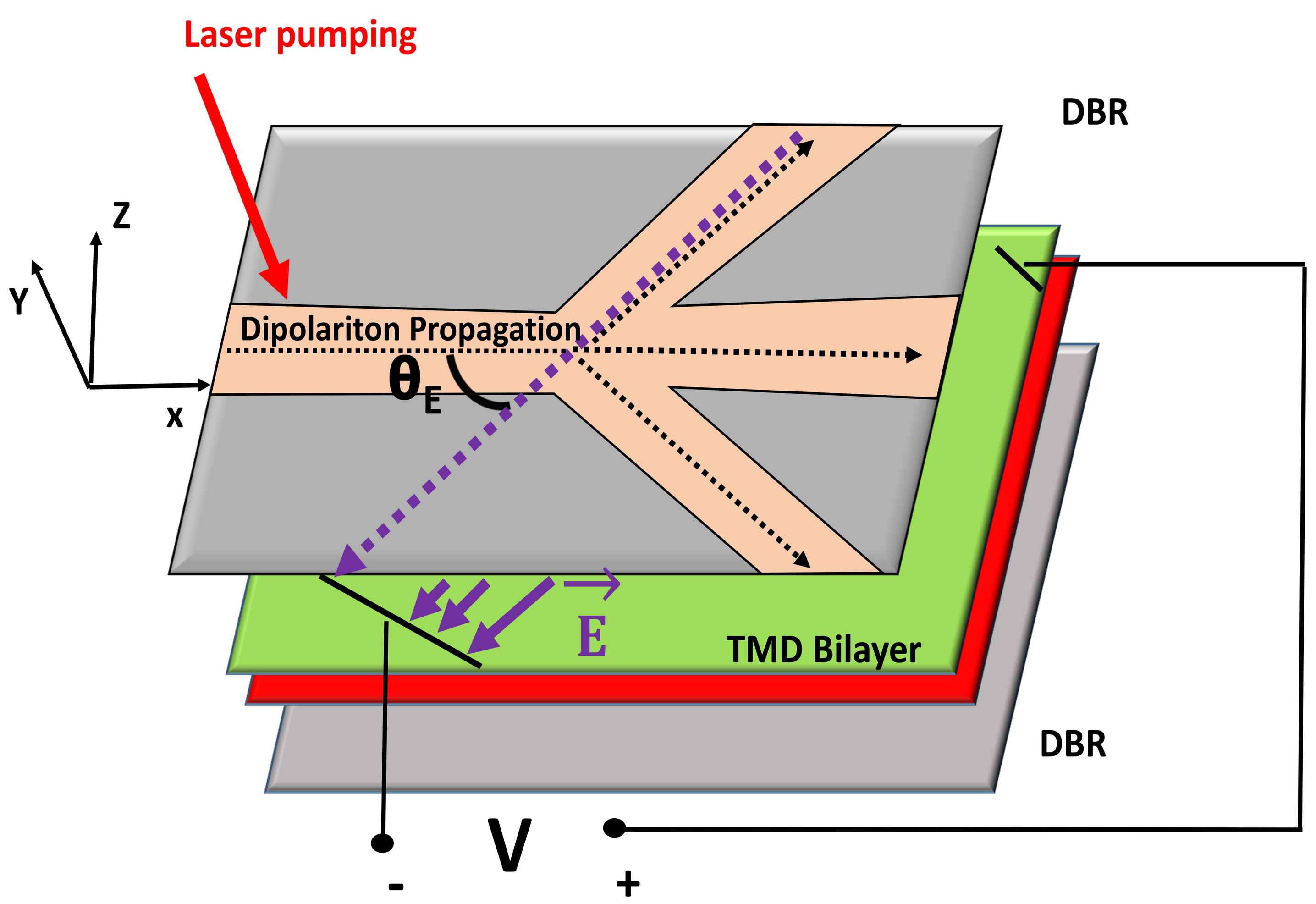
Dipolaritons in a TMDC

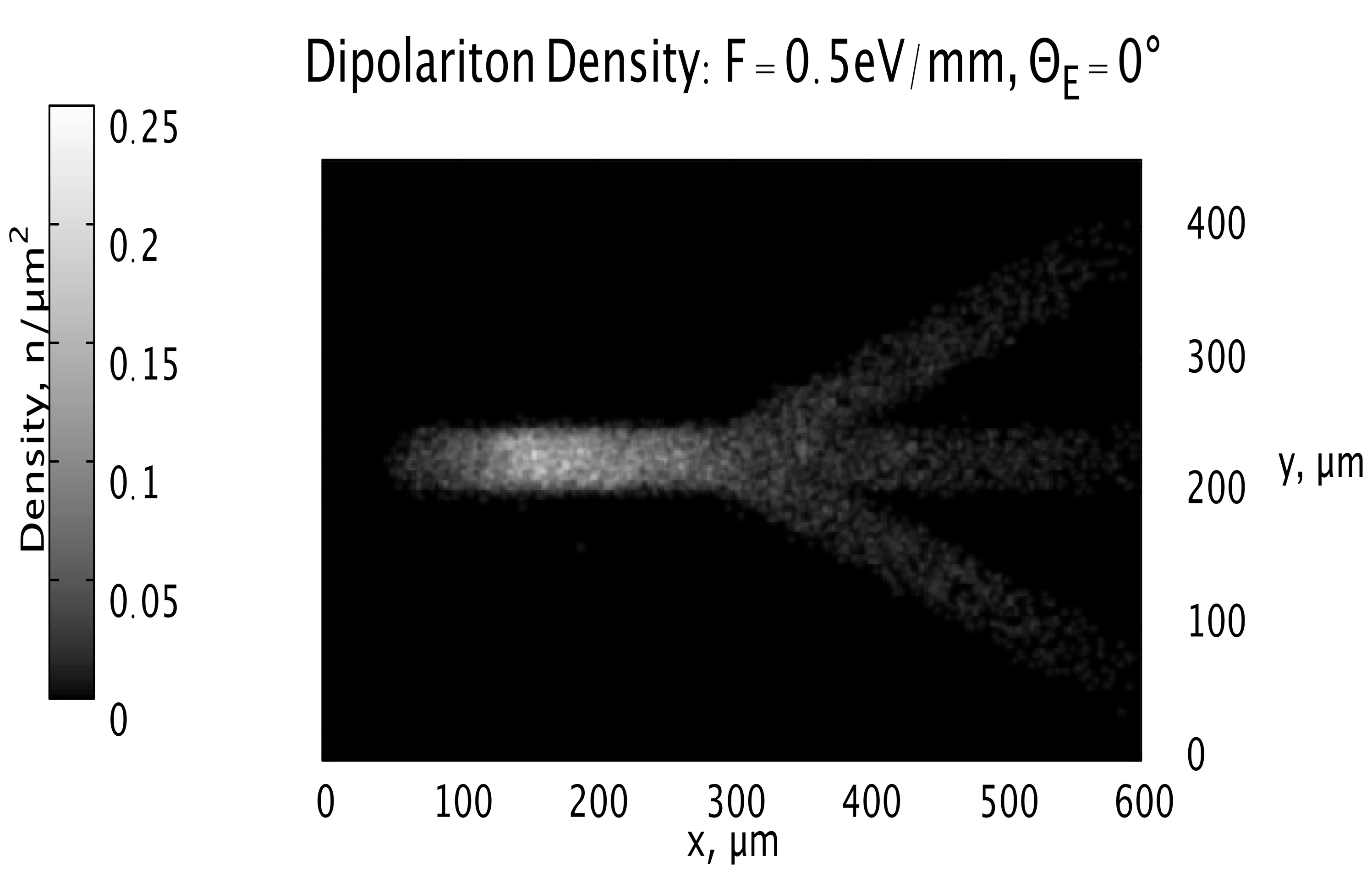
- Dipolaritons are a three way superposition of direct excitons, indirect excitons and cavity photons



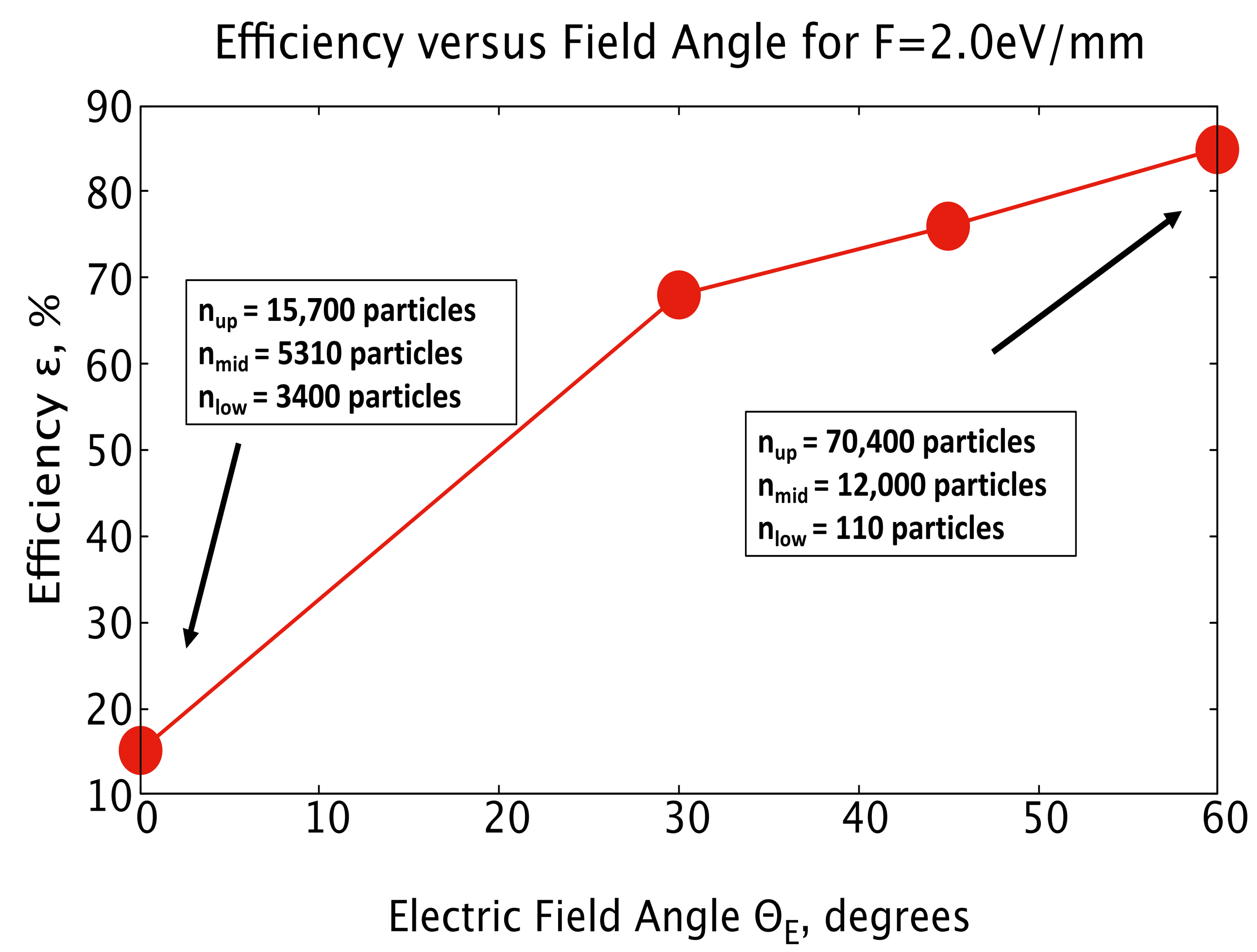
- Driven diffusion equation for dipolariton gas

$$\mathbf{dr} = \eta_{dip}(\mathbf{F}(\mathbf{r}(t), t)dt + \sqrt{2D}d\zeta(t)$$

Dipolariton Density in a Ψ-Shaped Channel

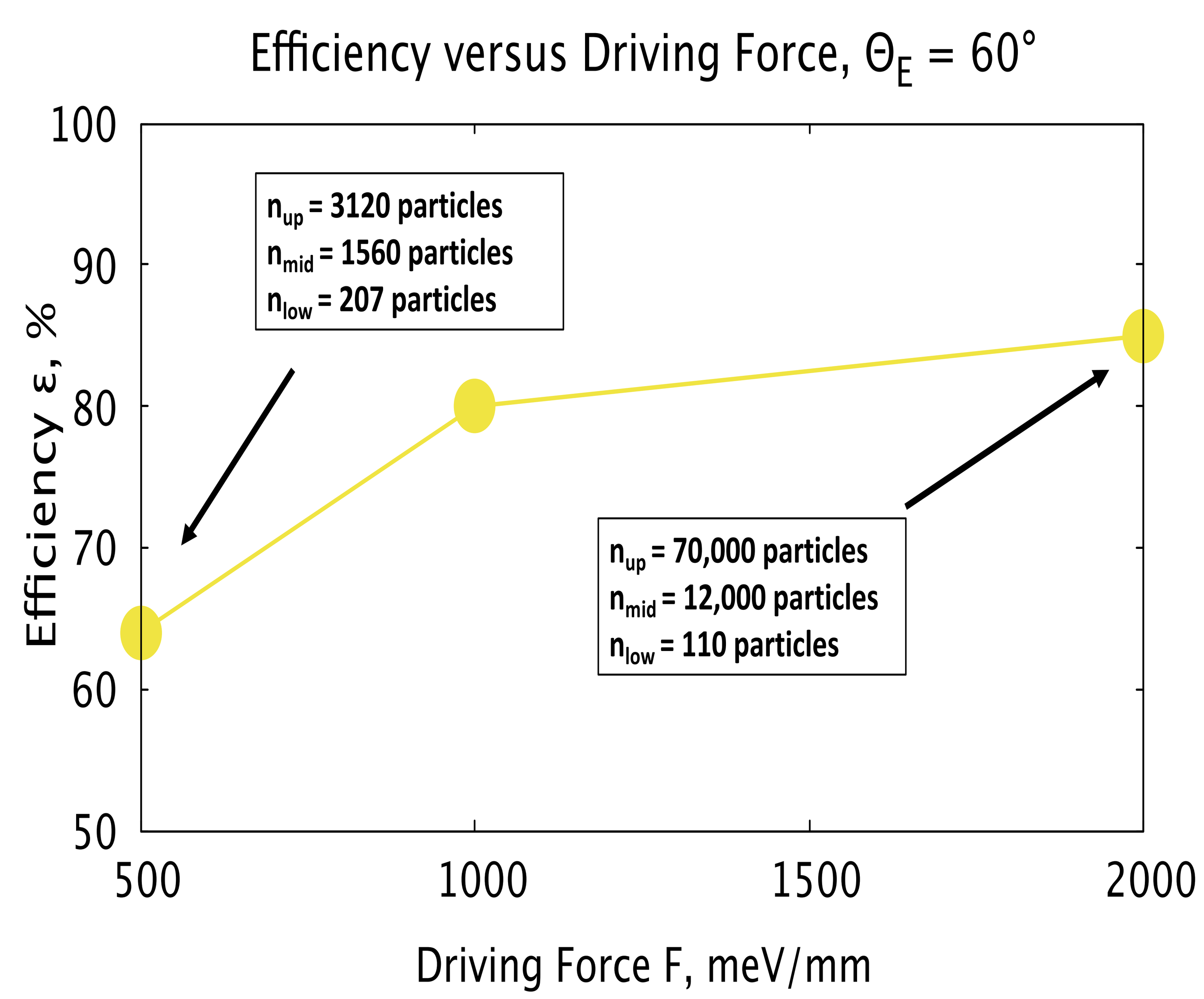


Efficiency in Ψ-Shaped Channel

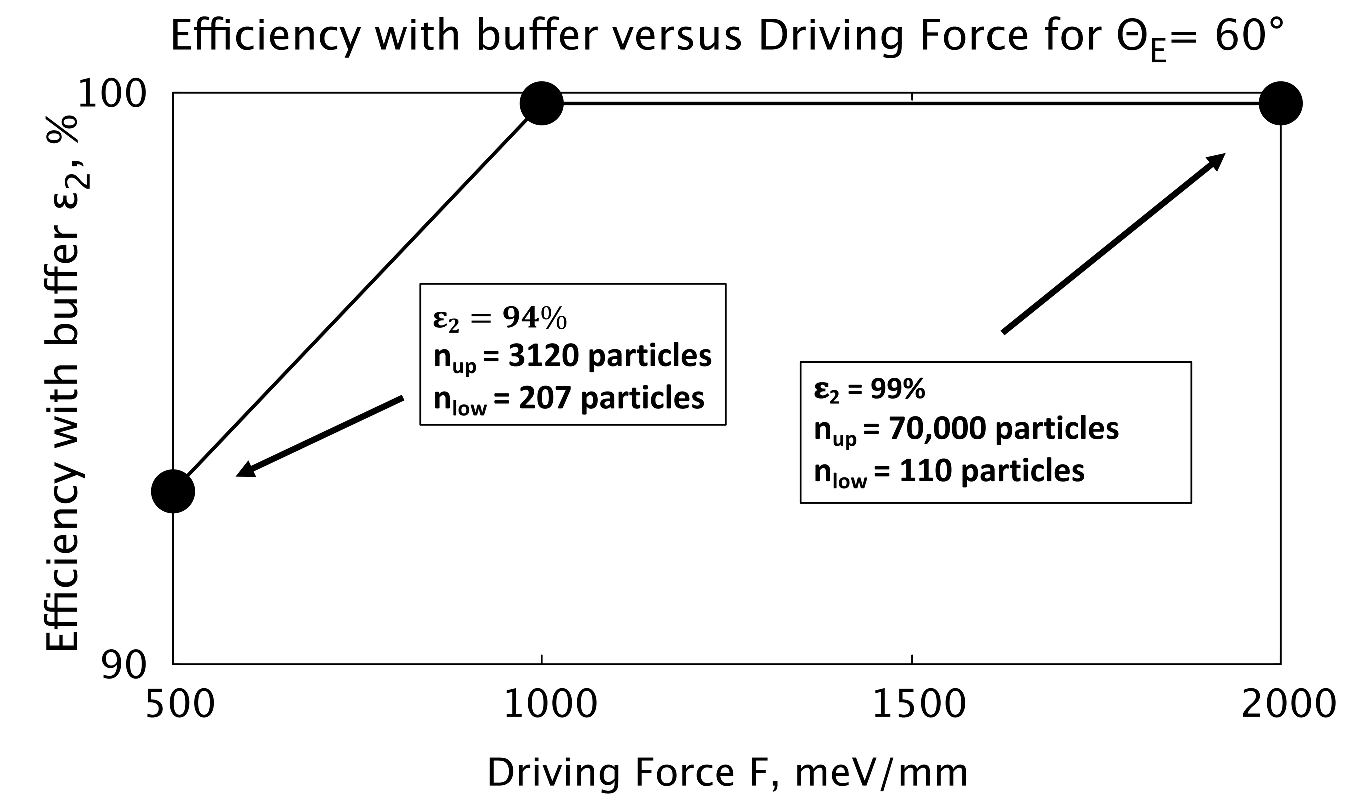


$$\varepsilon = \frac{n_{up}}{n_{up} + n_{mid} + n_{low}} \times 100\%$$

- ε characterizes the distribution of dipolariton population in the channel based on n_{up}, n_{mid} and n_{low}, the upper, middle and lower branch populations, respectively

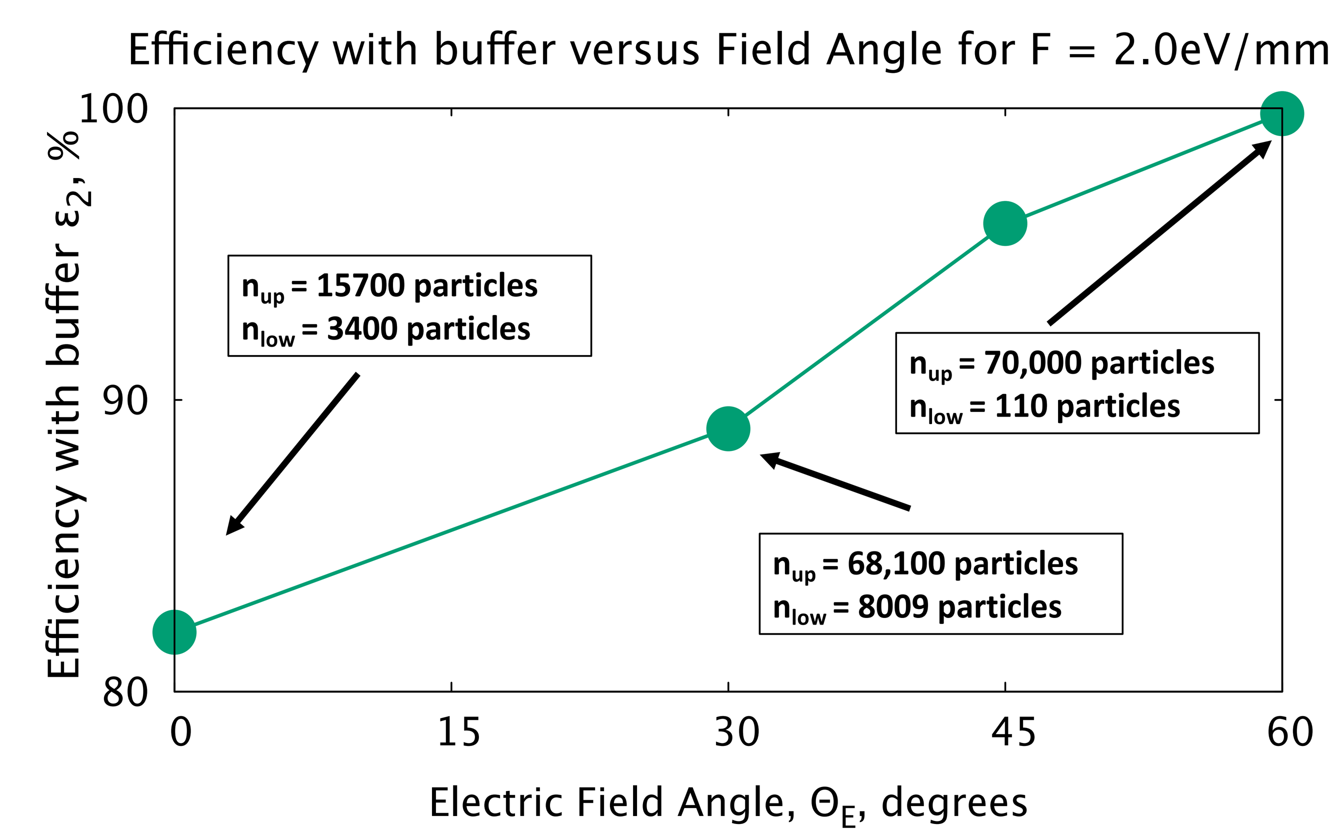


Efficiency of channel with a buffer



$$\varepsilon_2 = \frac{n_{up}}{n_{up} + n_{low}} \times 100\%$$

- ε_2 characterizes the distribution of dipolariton population in the channel when the middle branch is taken to be a buffer. This models a Y-shaped channel



Conclusions

- Efficiency can be improved upon increase of driving force and electric field angle
- Buffered channel closely replicates distribution of a Y-shaped channel

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