

## Talk outline

- What is Dielectrophoresis?
  - Theory
  - Application for single-cell trapping
- Stationary study
  - Electric field and laminar flow
  - Clausius-Mossotti factor
- Particle tracing for fluid flow
  - Pressure
  - Trap size
  - Behavior of different cells
- Conclusion

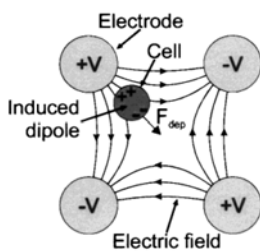
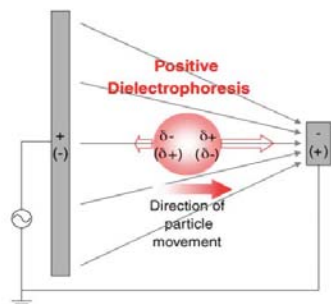


Outline

kevin.keim@epfl.ch | 30-Oct-18

3

## What is Dielectrophoresis?



$$\langle F_{DEP} \rangle = \pi \epsilon_m \epsilon_0 R^3 \text{Re}[CM] \nabla E_{pk}^2$$

Doh and Cho, *Sensors Actuators, A Phys.*, 2005  
Voldman et al., *Anal. Chem.*, 2002



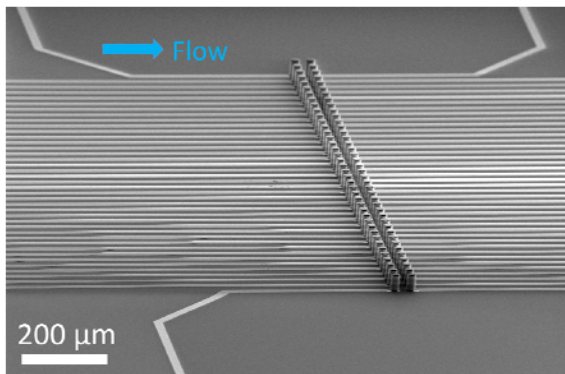
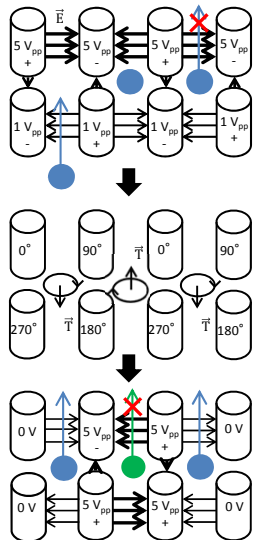
Dielectrophoresis

Theory

kevin.keim@epfl.ch | 30-Oct-18

4

### What is Dielectrophoresis?



EPFL Dielectrophoresis Cell trapping

kevin.keim@epfl.ch | 30-Oct-18 | 5

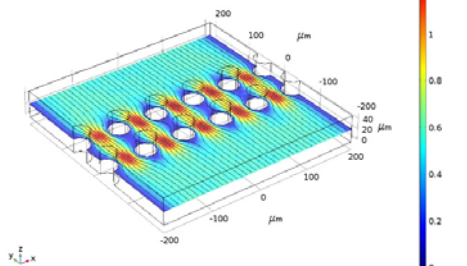
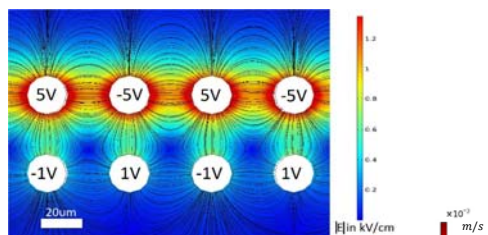
### Electric field and laminar flow

Dielectrophoretic force

$$\langle F_{DEP} \rangle = \pi \epsilon_m \epsilon_0 R^3 \text{Re}[CM] \nabla E_{pk}^2$$

Drag force

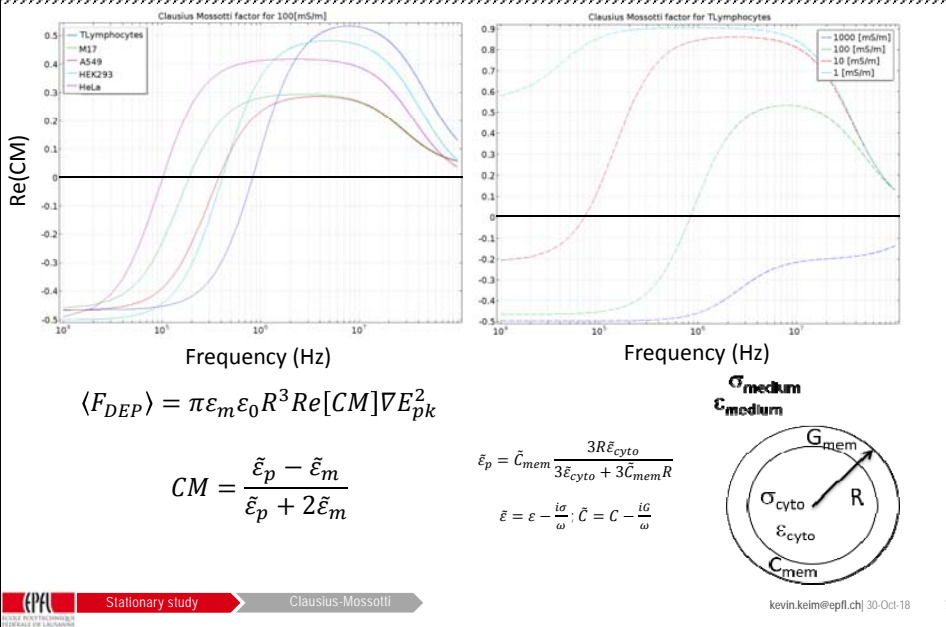
$$\langle F_{drag} \rangle = -6\pi\eta Rv$$



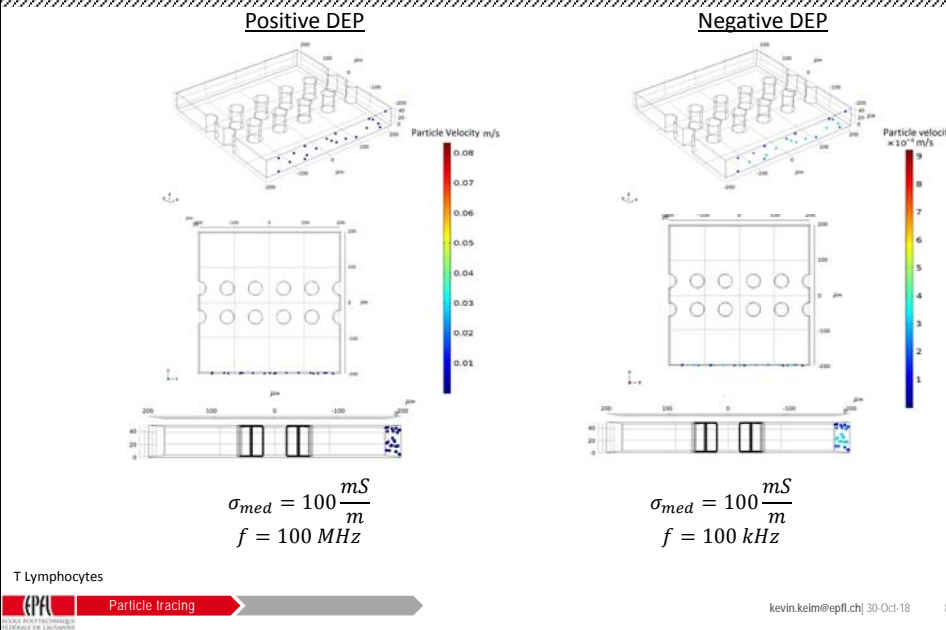
EPFL Stationary study E-field and flow

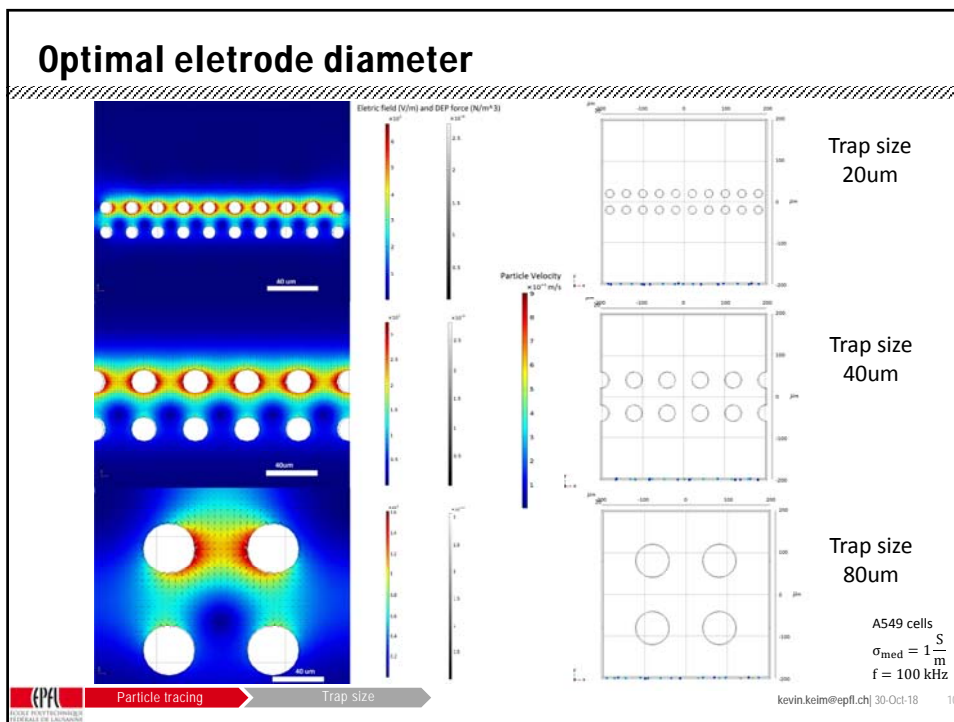
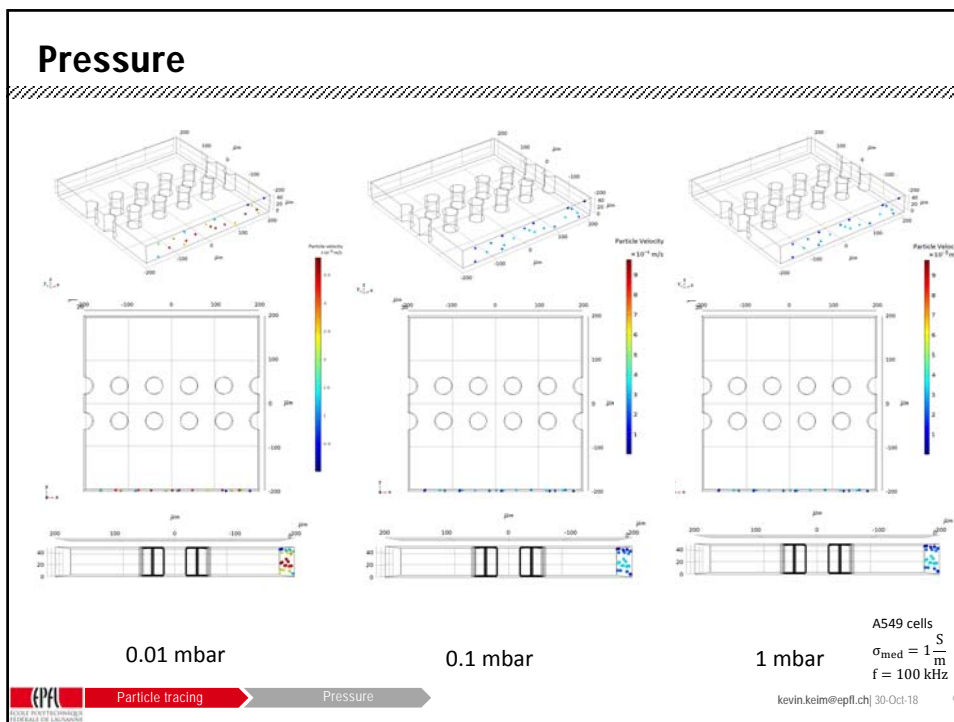
Velocity kevin.keim@epfl.ch | 30-Oct-18 | 6

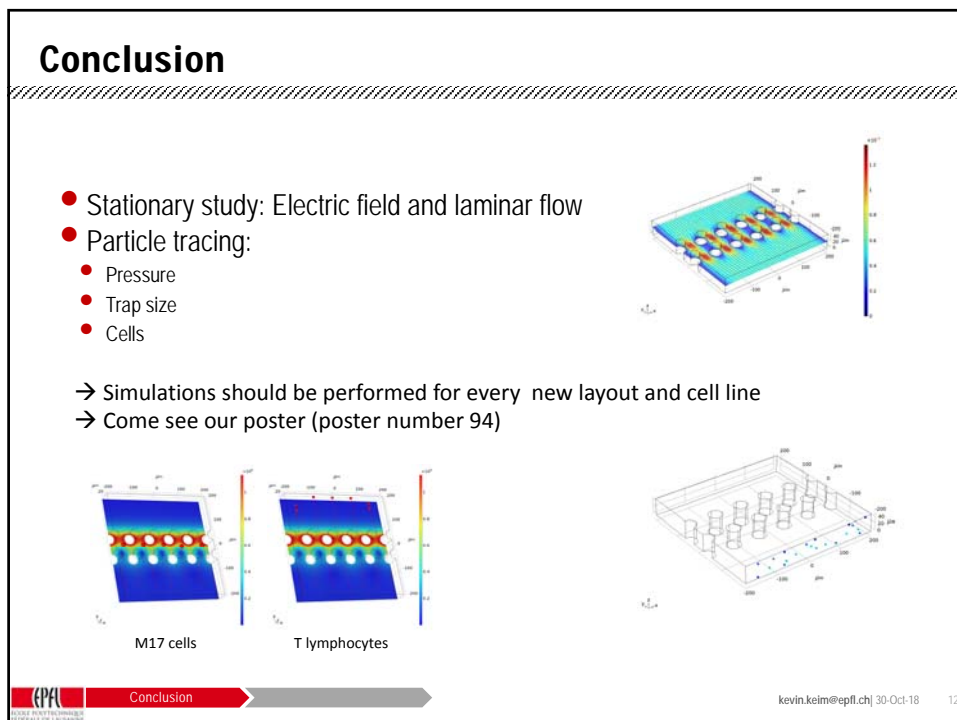
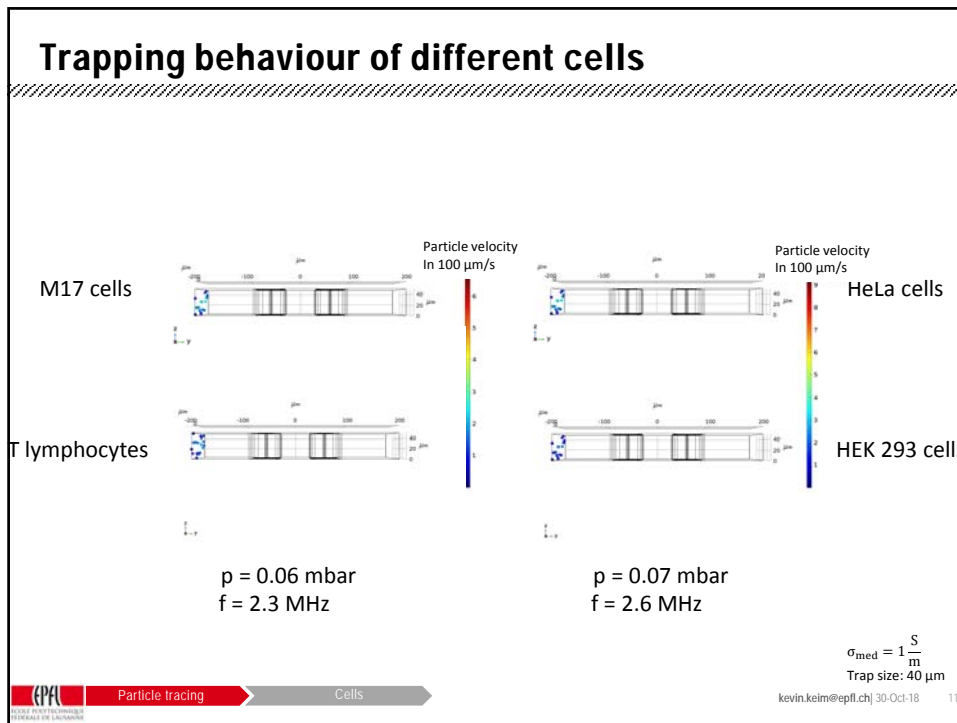
### Clausius-Mossotti factor



### Particle tracing for fluid flow







**Thank you for your attention!**



**António Gonçalves  
Carlotta Guiducci**

**Paul Éry  
Aurélien Delattre**

**Lilia Salimova  
Saurabh Tomar  
Pierre Thiriet  
Erick Garcia  
Enrico Tenaglia**



→ Come see our poster (poster number 94)

