

Exercise 1.3-3

What does it take to build a 4 GHz Microprocessor?

■ A typical **MOS** transistor of **200x** (**x = 0 5**) vintage has a "gate length" (= distance between source and drain) of about **0.5 μm** and is run at about **3 V**

- 1.) What is the mobility the material (= semiconductor) must have? Discuss the result for known mobility values and consider the following points
 - Transistor speed = device speed ??
 - Mobility range for a given material ??
 - Could we have powerful **PCs** without micro- or nanotechnology ??
- 2.) How could you increase the speed for a given material
 - In principle?
 - Considering that there are limits. e.g. to field strengths?



Solution