

Tasks

- (1) Read chapter 7**
- (2) Solve exercise sheets**
- (3) Who is summarizing next week?**

20 & 25th April

2 & 4th May

9 & 16th May

18 & 23th May

30th May & 1st June

Chapter 6

Chapter 7

Chapter 8

Chapter 9

Wrap-up

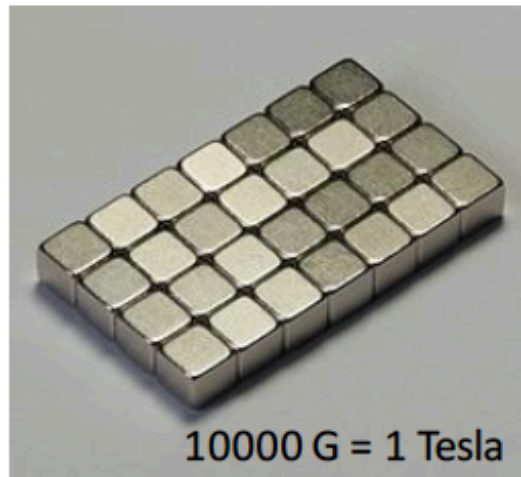
Magnetic field

Human Brain



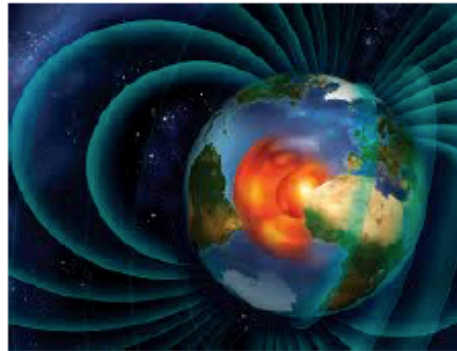
1 nG to 10 nG

Neodymium – iron – boron
 $\text{Nd}_2\text{Fe}_{14}\text{B}$ Magnet



10000 G = 1 Tesla

Earth



0.25 - 0.65 Gauss

Static 45 –Tesla
Hybrid magnet



Fridge Magnets

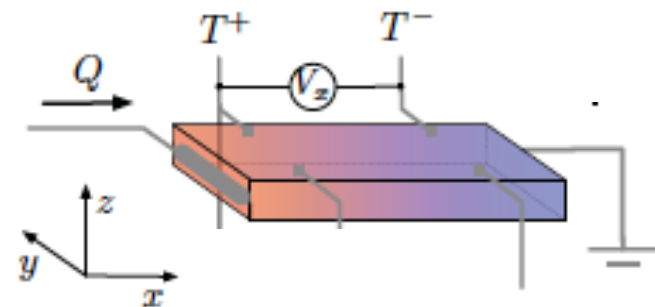
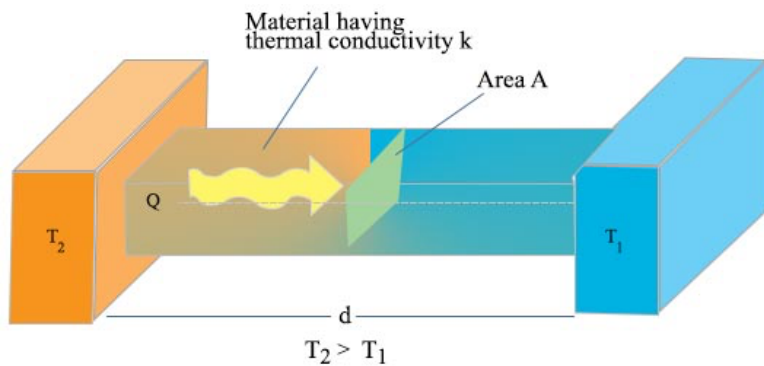


50 Gauss

100 Tesla
Pulsed magnet



Material Property	Coefficient	In classed
Resistivity		
Hall coefficient		
Heat capacity		
Thermal conductivity		
Thermopower / Seebeck effect		



Material Property	Coefficient	In classed
Resistivity	$\rho = \frac{m^*}{ne^2\tau}$ or $\sigma = \frac{ne^2\tau}{m^*}$	Discussed / Proven
Hall coefficient	$R_H = \frac{-1}{en}$	Discussed / Proven
Heat capacity	$\frac{C}{T} = \gamma = \frac{1}{3}\pi^2 k_B^2 \text{DOS}(\epsilon_F) \propto m^*$	Discussed / Proven
Thermal conductivity	$\frac{\kappa}{T} = \frac{nk_B^2\pi^2\tau}{3m^*}$	Not proven
Thermopower / Seebeck effect	$\frac{S}{T} = \frac{\pm\pi^2 k_B}{2} \frac{1}{e T_F} \propto \frac{m^*}{n}$	Not proven

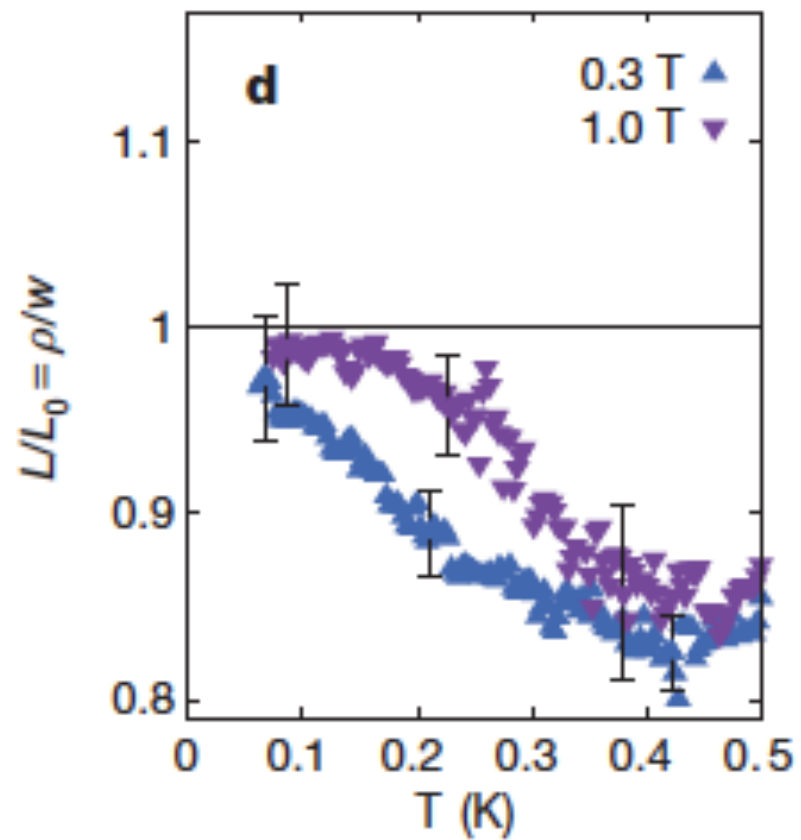
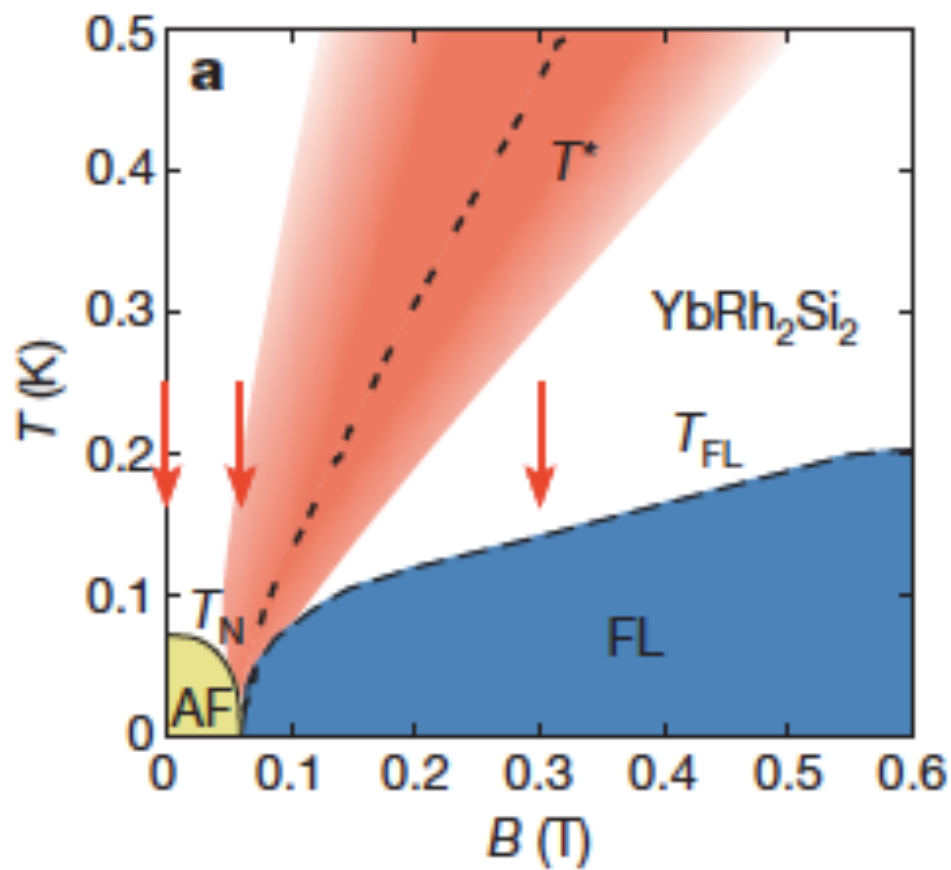
Wiedemann Franz Law

$$\frac{\kappa}{\sigma T} = \boxed{\phantom{\frac{\pi^2 k_B^2}{3e^2}}}$$

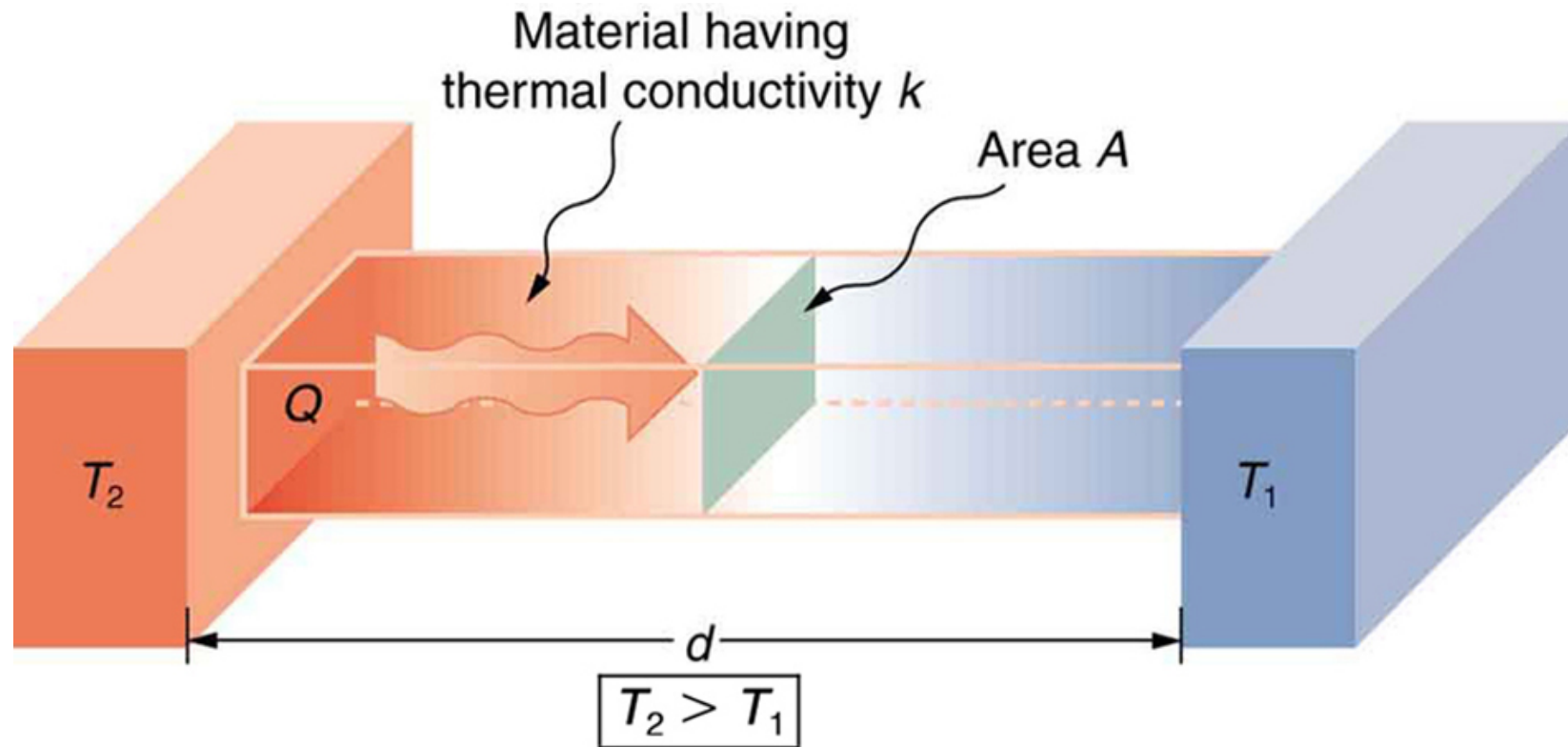
Lorenz Number

$$L_0 = \frac{\pi^2 k_B^2}{3 e^2}$$

Wiedemann Franz Law



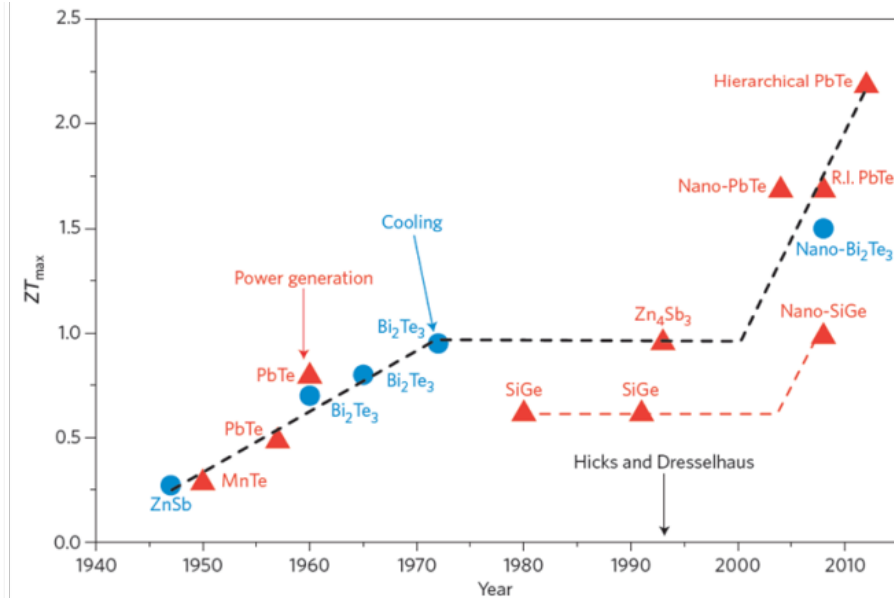
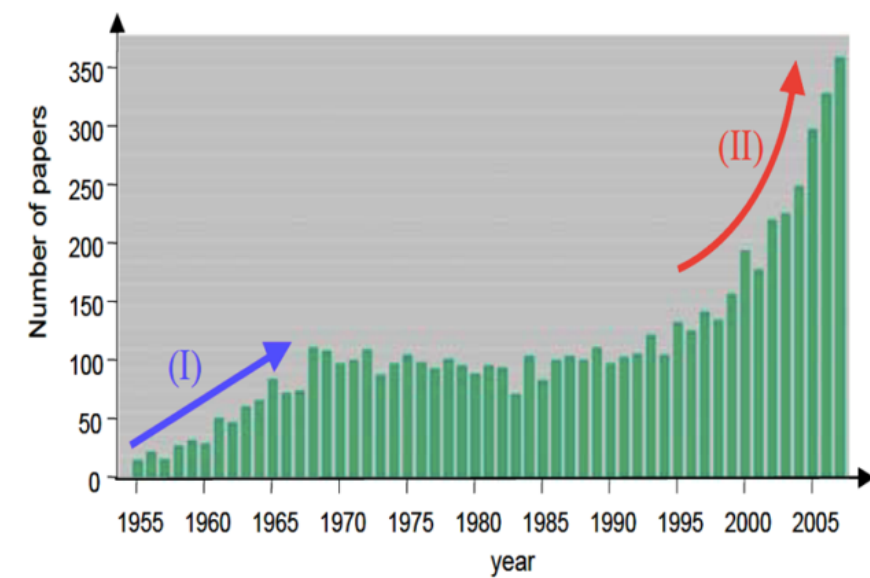
S versus κ



$$\kappa = \frac{d P}{A \Delta T} \quad \text{or} \quad \kappa \Delta T = \frac{d}{A} P$$

$$S = \frac{\Delta V}{\Delta T} \quad \text{or} \quad S \Delta T = \Delta V$$

Thermopower



http://iramis.cea.fr/en/Phoce/Vie_des_labos/Ast/ast_visu.php?id_ast=1861