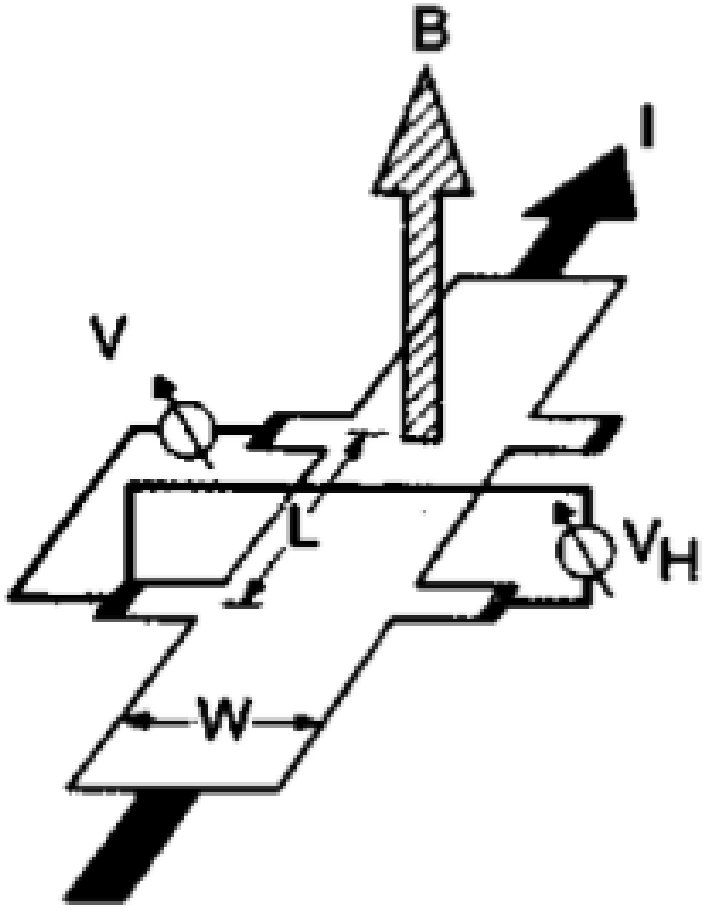
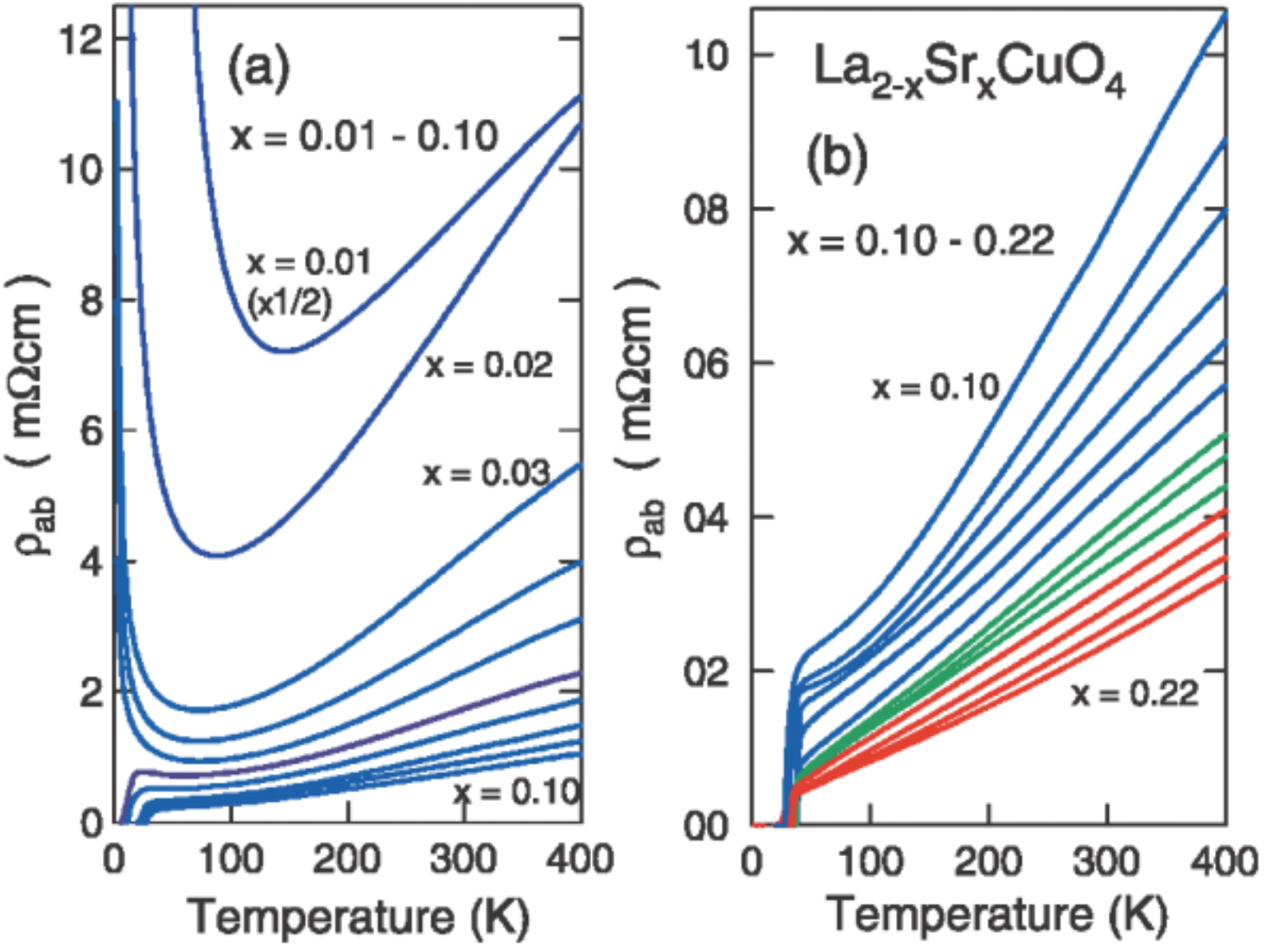
P#9: Transportna svojstva kristala

Fizika čvrstog stanja 2

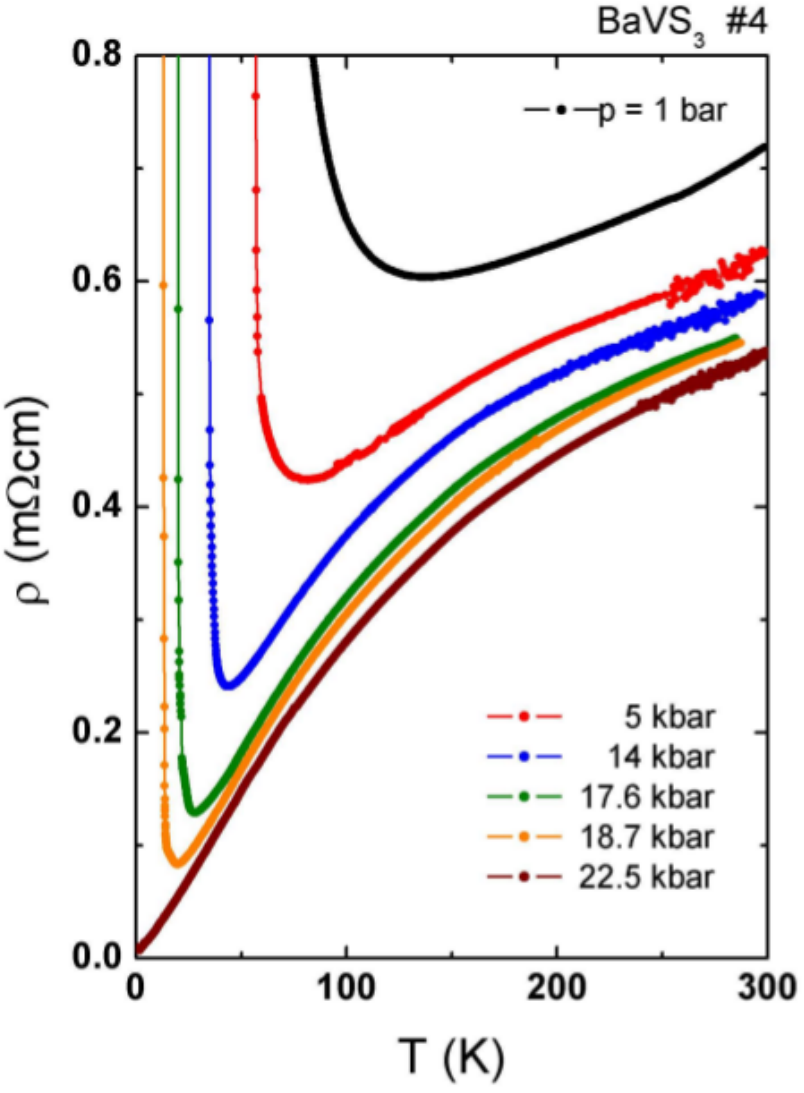
predavanja 2022

9.3 Mjerenje otpornosti

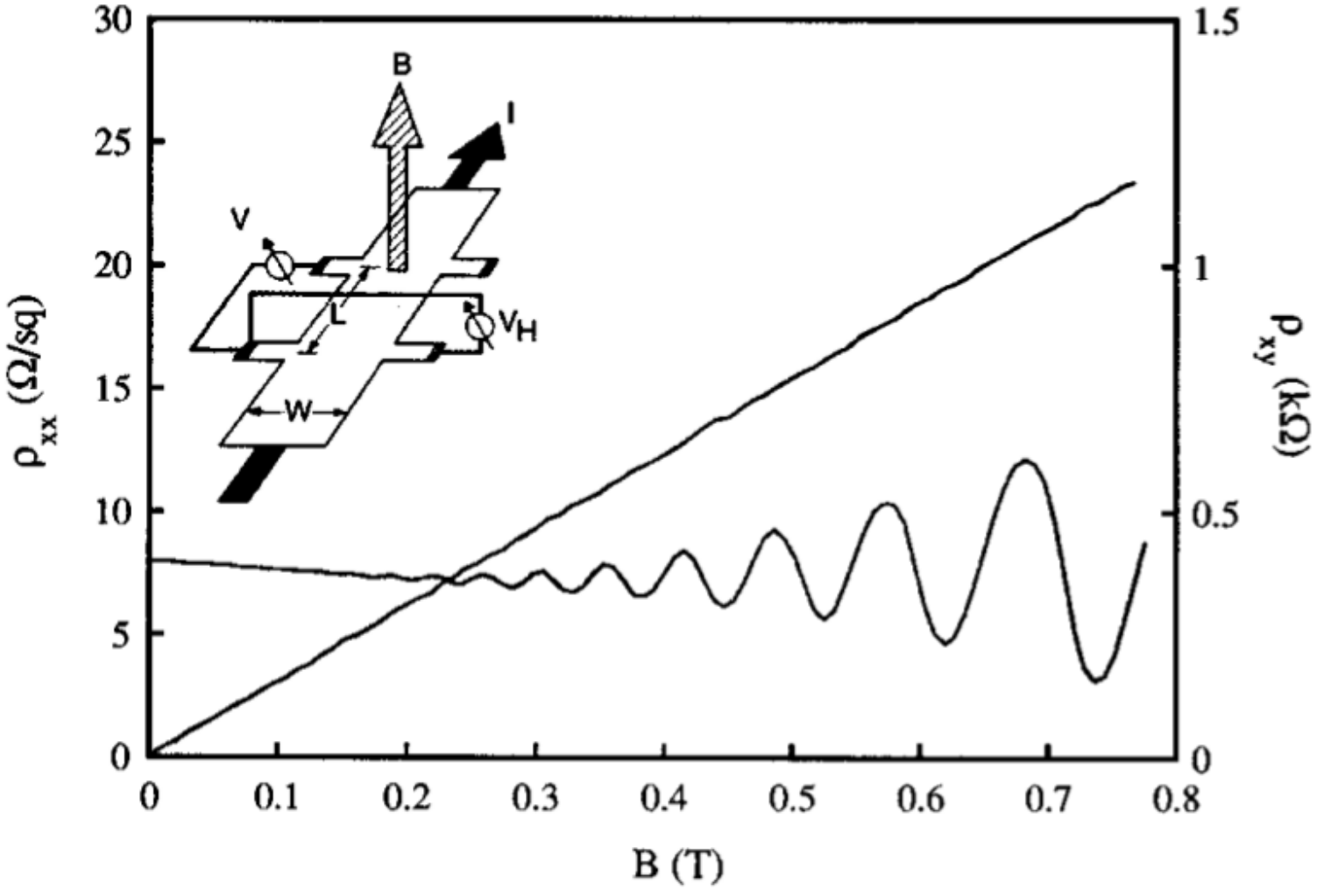



(a)
x = 0.01 - 0.10
x = 0.01
(x1/2)
x = 0.02
x = 0.03
x = 0.10
ρab (mΩcm)
Temperature (K)
La2-xSrxCuO4
(b)
x = 0.10 - 0.22
x = 0.10
x = 0.22
ρab (mΩcm)
Temperature (K)

Sustavi s metal-izolator faznim prijelazom



9.5 Hallov eksperiment

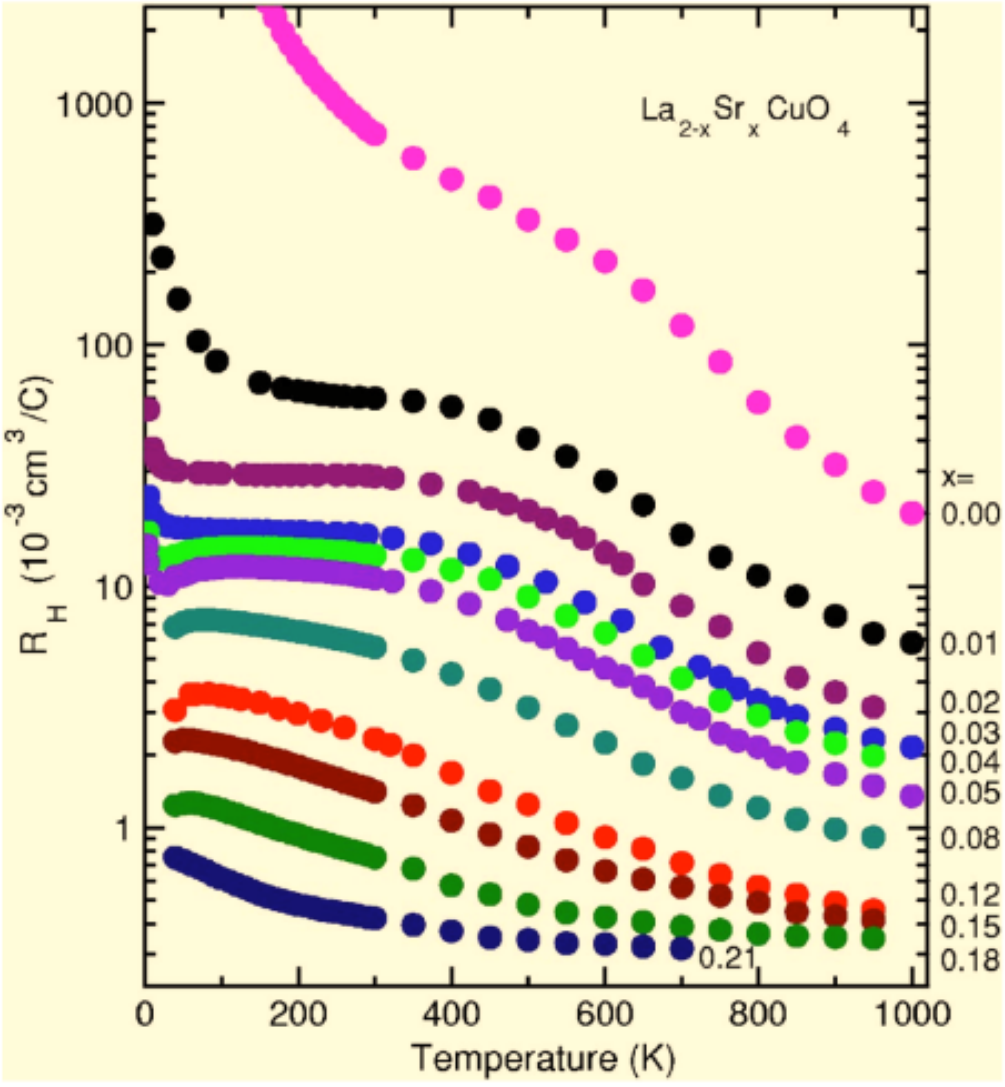


Hallova "konstanta"

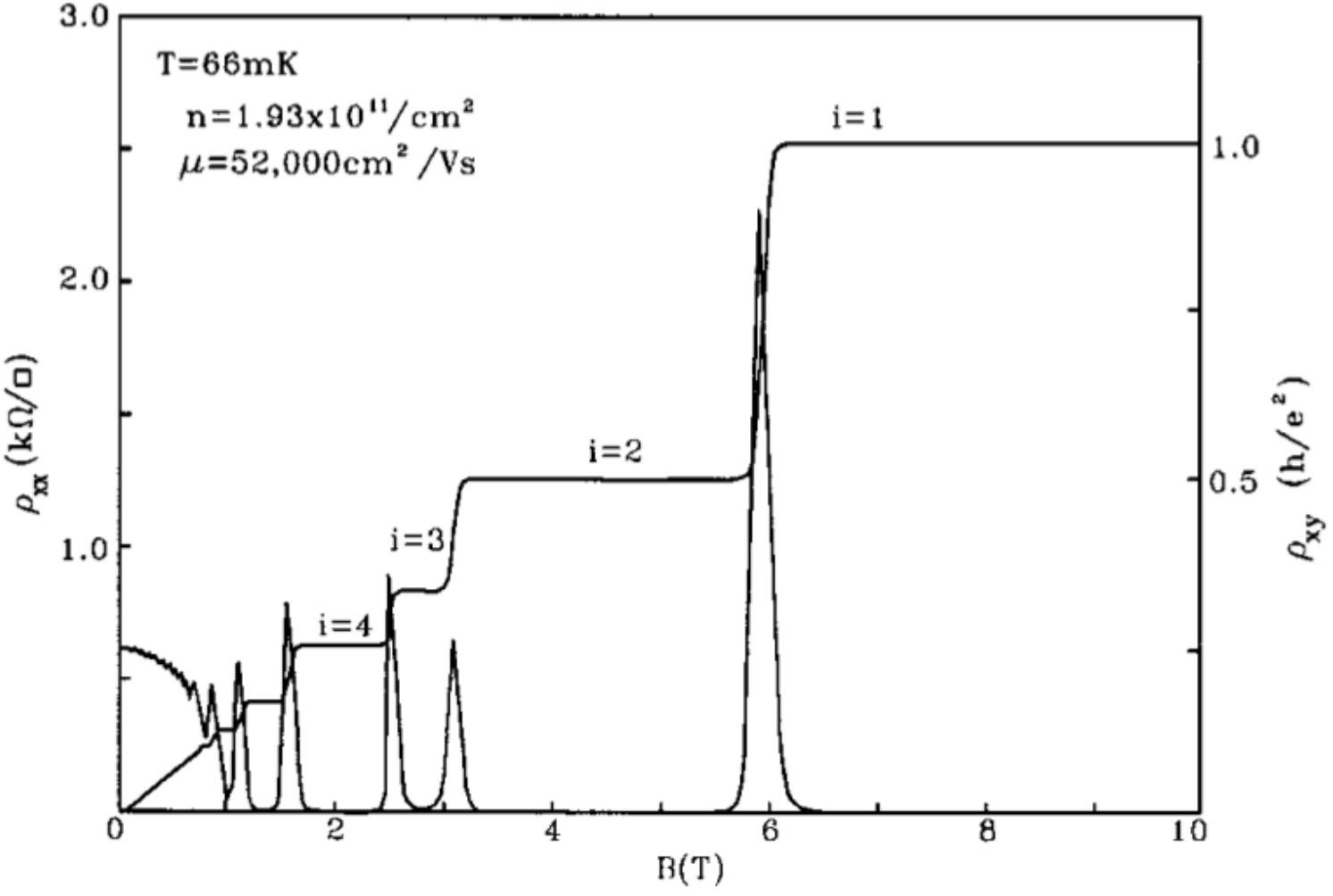
$$\rho_{xy}(H_z) = \frac{H_z}{q_i c\, n_H(H_z)} = R_H H_z$$

METAL	VALENCE	$-1/R_H nec$
Li	1	0.8
Na	1	1.2
K	1	1.1
Rb	1	1.0
Cs	1	0.9
Cu	1	1.5
Ag	1	1.3
Au	1	1.5
Be	2	−0.2
Mg	2	−0.4
In	3	−0.3
Al	3	−0.3

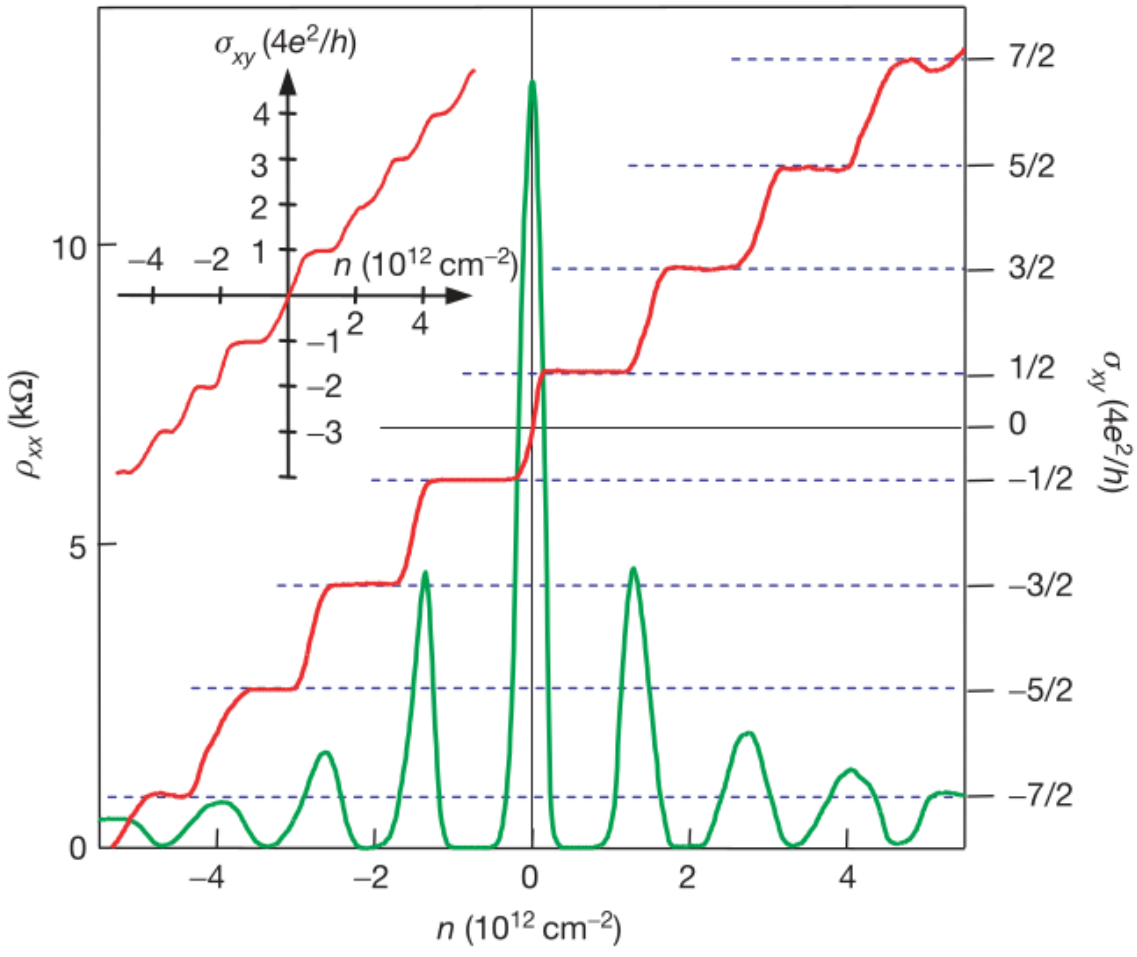
Supravodljivi kuprati



Kvantni Hallov efekt



Kvantni Hallov efekt (grafen)

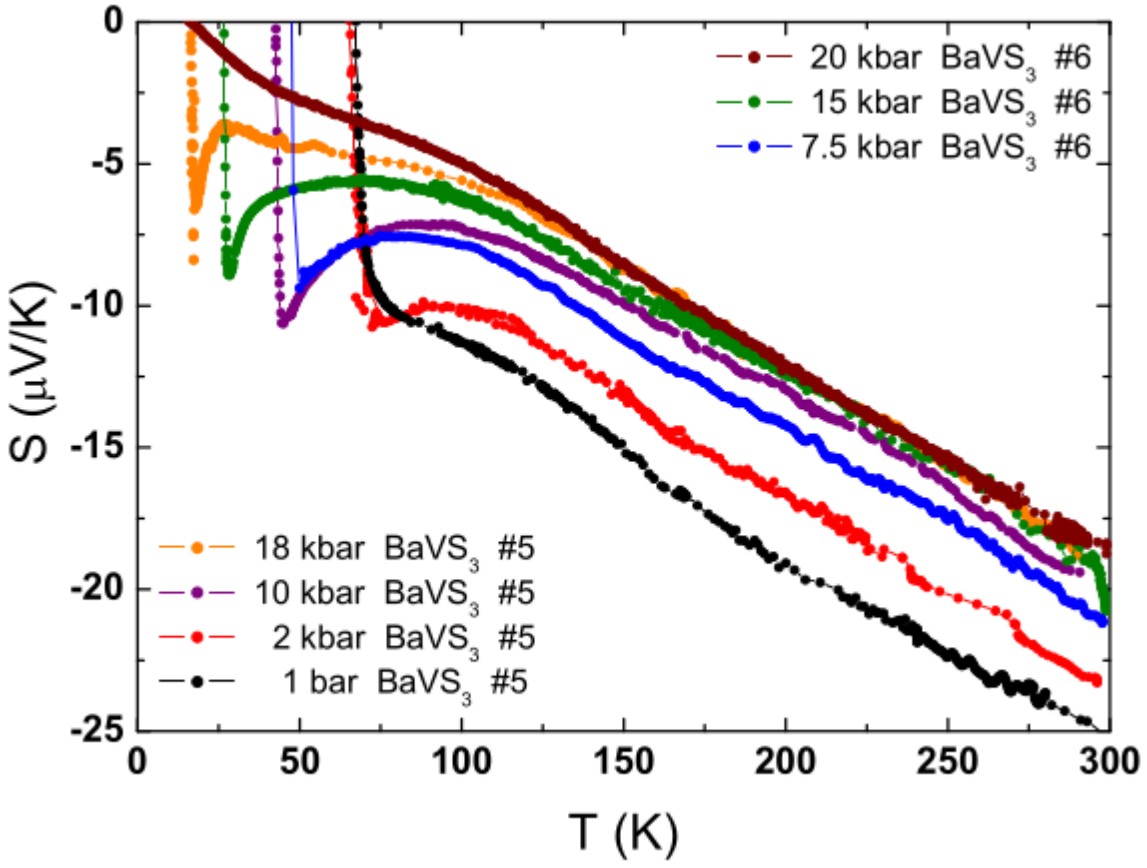


9.6 Termalna vodljivost i termoelektrična snaga

metal	S (μV/K)	metal	S (μV/K)
Li	14	Pd	-9.99
Na	-5	Pt	-5.28
K	-12.5	Cu	1.83
Rb	-8.3	Ag	1.51
V	1.0	Au	1.94
Cr	17.3	Al	-1.8
W	1.07	Pb	-1.05

METAL	VALENCE	$-1/R_H nec$
Li	1	0.8
Na	1	1.2
K	1	1.1
Rb	1	1.0
Cs	1	0.9
Cu	1	1.5
Ag	1	1.3
Au	1	1.5
Be	2	−0.2
Mg	2	−0.4
In	3	−0.3
Al	3	−0.3

Sustavi s metal-izolator faznim prijelazom



Literatura

1) Ziman, *Principles of the Theory of Solids*, §§ 7.1 - 7.3, 7.7 - 7.9
2) Ashcroft & Mermin, *Solid State Physics*, §§ 13.1, 13.4 - 13.8