Laboratory Journal

Master of Science

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Beginning 1 February 2018

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1-12 February 2018, Sample preparation

1 mesa-structure

hey how are you

2 Gate

Figure 1: Example figure.

3 Contacts

here i 'm going to wright something

13-25 February 2018, Transport measurements HgTe

1 Some theory notes

In order to calculate ρ_x we need to know geometrical parametr. In our case $\frac{S}{l} = 0.176$

2 Transport analysis

In order to check our sample we have done transport measurements. The sample is putted into Cryogenic Transport Measurement System(CFMS) and field dependancies of Rxx and Rxy are measured with different temperatures. In the fig1. the scheme of sample contacts is presented. Current is aplied to contuct 3 and 4 via resistor 1MOhm, the lockin voltage is 0.5V. We measure Rxx between contucts 1 and 2, Rxy between 1 and 6. Temperature dependence of Rxx and Rxy are presented in fig2. (Here will be tex about this dependance)

3 This shows a sample table

Groups	Treatment X	Treatment Y
1	0.2	0.8
2	0.17	0.7
3	0.24	0.75
4	0.68	0.3

Table 1: The effects of treatments X and Y on the four groups studied.

Table 1 shows that groups 1-3 reacted similarly to the two treatments but group 4 showed a reversed reaction.
Lets lokk into

14-22 March 2018, 746 Bi_2Se_3 measurements

1 Sample 746

We are working with a sample N 746 Bi_2Se_3 doped with Sr.

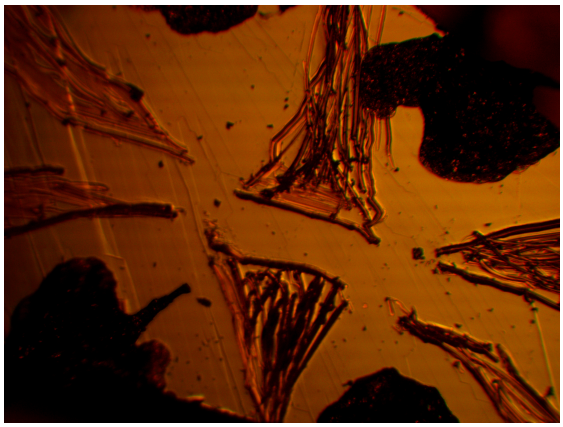

Figure 1: fig1. 746 Bi_2Se_3 sample

In the fig1. the photo of sample and contacts is presented. Current is aplied to contuct 6 and 3 via resistor 10M Ohm, the lockin voltage is 5V. We measure Rxx between contucts 1 and 2, Rxy between 2 and 4.
Geometrical parametr $\frac{S}{l} = 0.2518 \pm 0.0004$
Current R_{xx} N6 and N 3
Potential R_{xx} N1 and N 2
Potential R_{xy} N2 and N 4

	1	**2**	**3**	**4**	**5**	**6**
1		6K Ohm	17K Ohm	11,2K Ohm		6K Ohm
2	6,4K Ohm		14,4K Ohm	8,4K Ohm		8,5K Ohm
3	10,6K Ohm	14,3K Ohm		19,8K Ohm		18,8K Ohm
4	11,3K Ohm	8,4K Ohm	19,8K Ohm			13,6K Ohm
5						
6	6K Ohm	8,5K Ohm	18,8K Ohm	13,6K Ohm		

Table 1: Bi2Se3 (746) R b-w contacts

The resistance of between N5 and N-, $R_5 > 100KOhm$, but it is not a problem(3 potential contacts is acceptable for transport measurements).

2 Measurements

The sample is putted into Cryogenic Transport Measurement System(CFMS) and field dependancies of Rxx and Rxy are measured with different temperatures(2,4,8,16,32). List of measurements is dipslayed in table2.

File	**Field**	**Temperature**	**Voltage**	**Comment**
Field.sweep.4.lock.in15.03.1810.35.51	0T	from 120K to 5K	0.1V	Low I
Field.sweep.4.lock.in15.03.1811.18.22	0T	from 5 to 1.7K		0.1V Low I
Field.sweep.4.lock.in15.03.1811.37.50	0T	from 5.7K to 1.7K	0.05V	Low I
Field.sweep.4.lock.in15.03.1812.00.15	from 1T to 1T	2K	0.1V	Low I
Field.sweep.4.lock.in15.03.1812.16.32	from 1T to -1T	2K	0.1V	Low I
Field.sweep.4.lock.in15.03.1813.08.18	from 1T to -1T	2K	5V	Ok
Field.sweep.4.lock.in15.03.1814.44.10	from -1T to 1T	2K	5V	Ok
Field.sweep.4.lock.in15.03.1814.55.26	from 4T to -4T	2K	5V	Ok
Field.sweep.4.lock.in15.03.1815.26.28	from -4T to 4T	4K	5V	noisy
Field.sweep.4.lock.in15.03.1816.06.11	from -4T to 4T	8K	5V	Ok
Field.sweep.4.lock.in15.03.1816.38.40	from 4T to -4T	16K	5V	Ok
Field.sweep.4.lock.in15.03.1817.26.48	from 4T to -4T	32K	5V	Ok
Field.sweep.4.lock.in15.03.1818.29.31	from 0T to 14T	2K	5V	Ok
Field.sweep.4.lock.in15.03.1819.42.59	from 4T to -4T	4K	5V	Ok

Table 2: Measurements and files

3 Results

In order to find out charge mobility and consentration we analize transport measurements. For each temperature we have field dependance from -4T to 4T(2,4,8,16,32).

After symmetrization we get R_H, n and μ
RRR=1.43
2Kelv

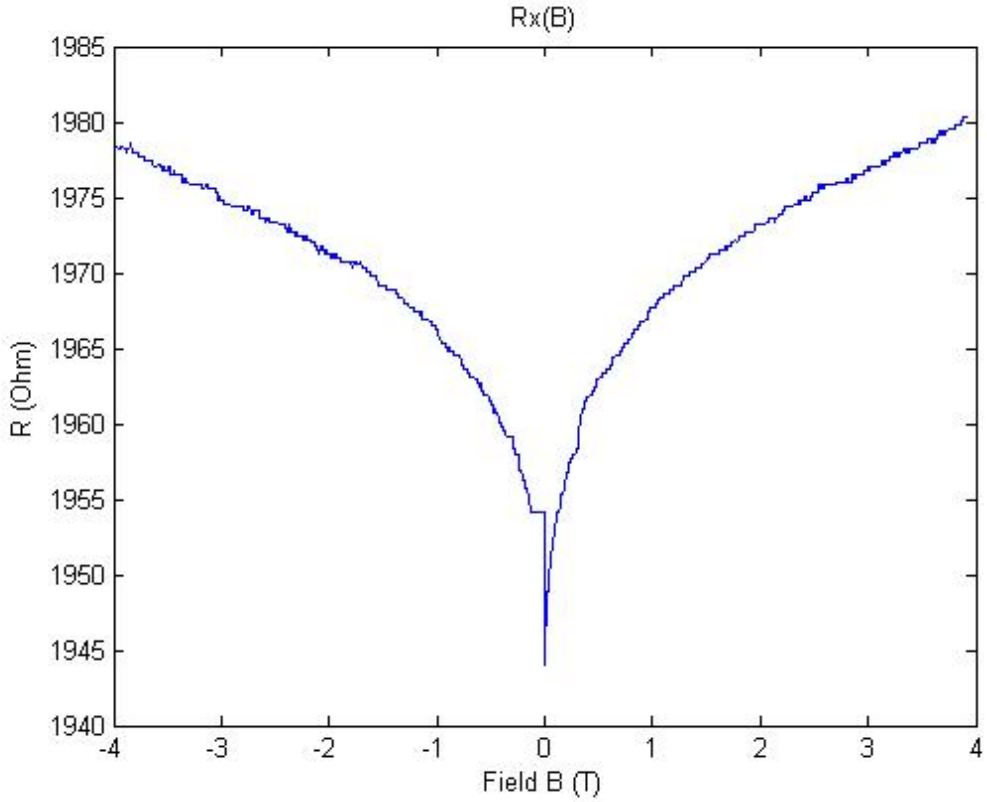

Figure 2: 2Kelvins Rx(B)

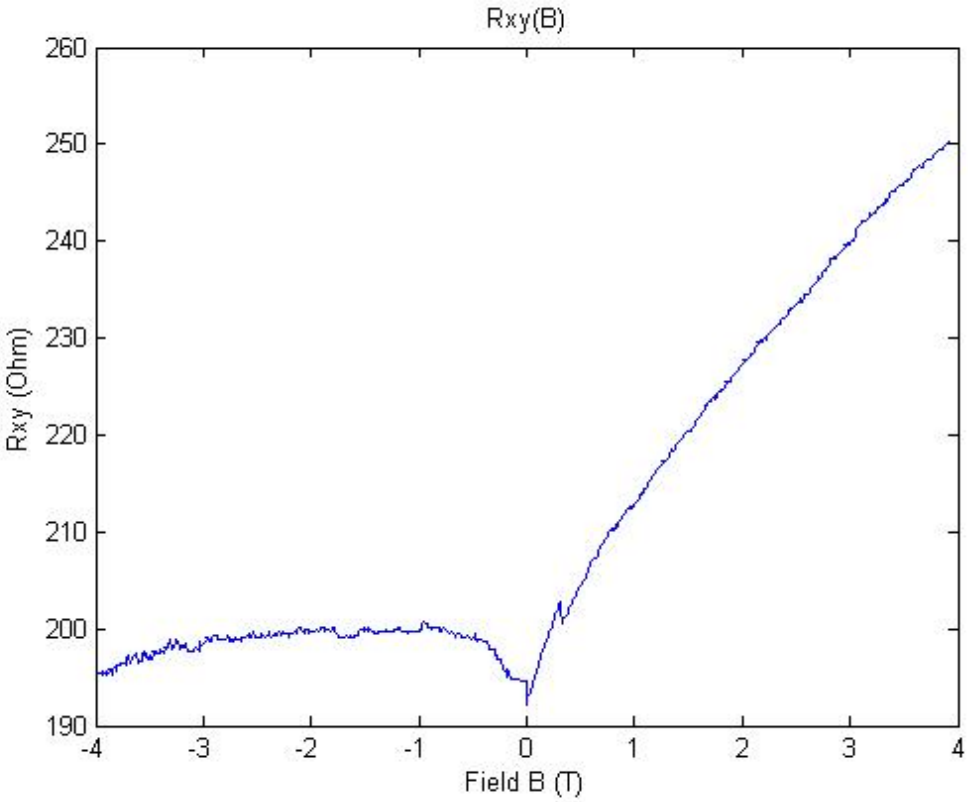

Figure 3: 2Kelvins Ry(B)

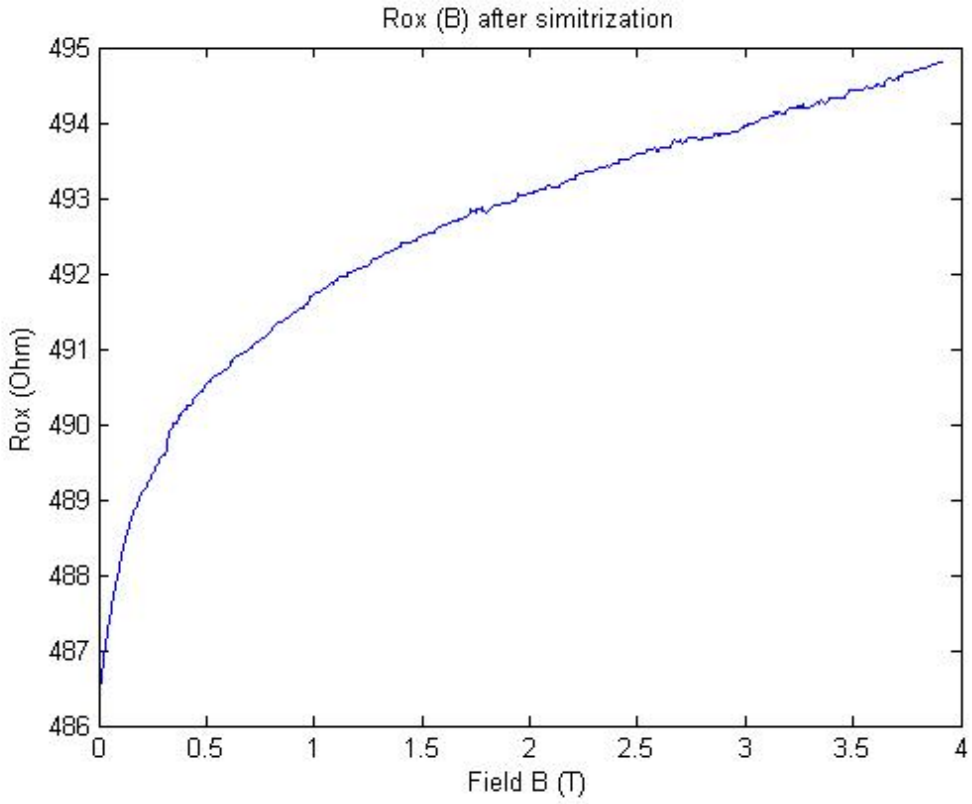

Figure 4: 2Kelvins Rx(B) after symetrization

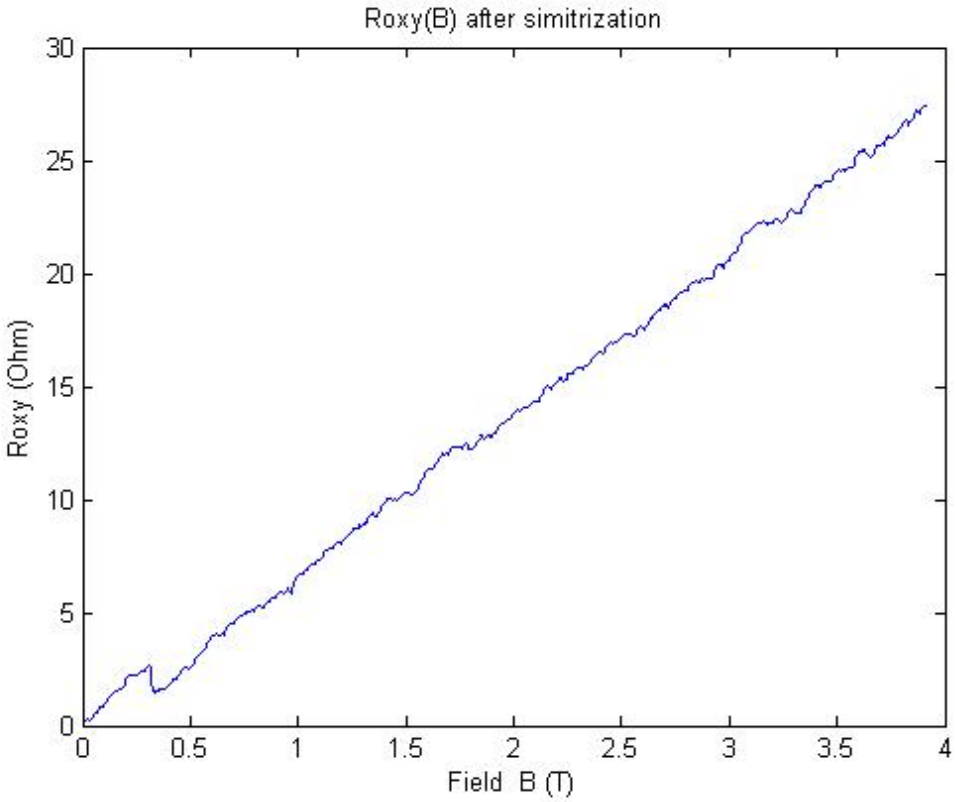

Figure 5: 2Kelvins Ry(B) after symetrization

2Kelv
$R_H = 7.011 \frac{Ohm}{T}$
$n = 8.9 * 10^{13} cm^{-2}$
$\mu = 0.0142 \frac{m^2}{V*s}$

4Kelv

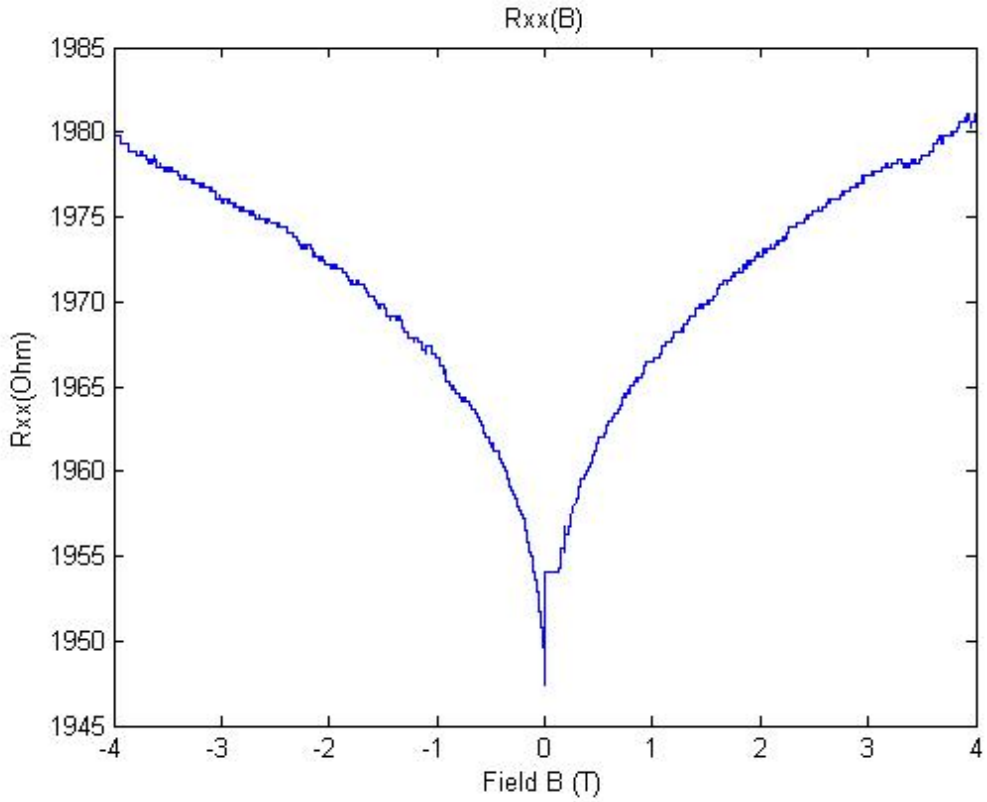

Figure 6: 4Kelvins Rx(B)

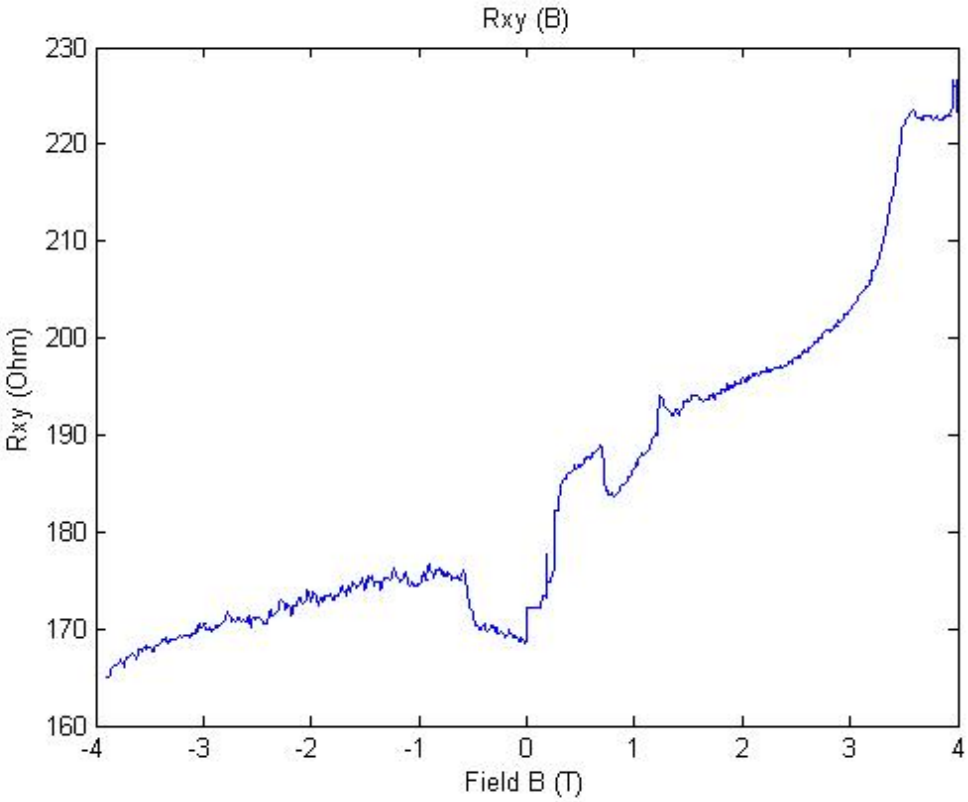

Figure 7: 4Kelvins Ry(B)

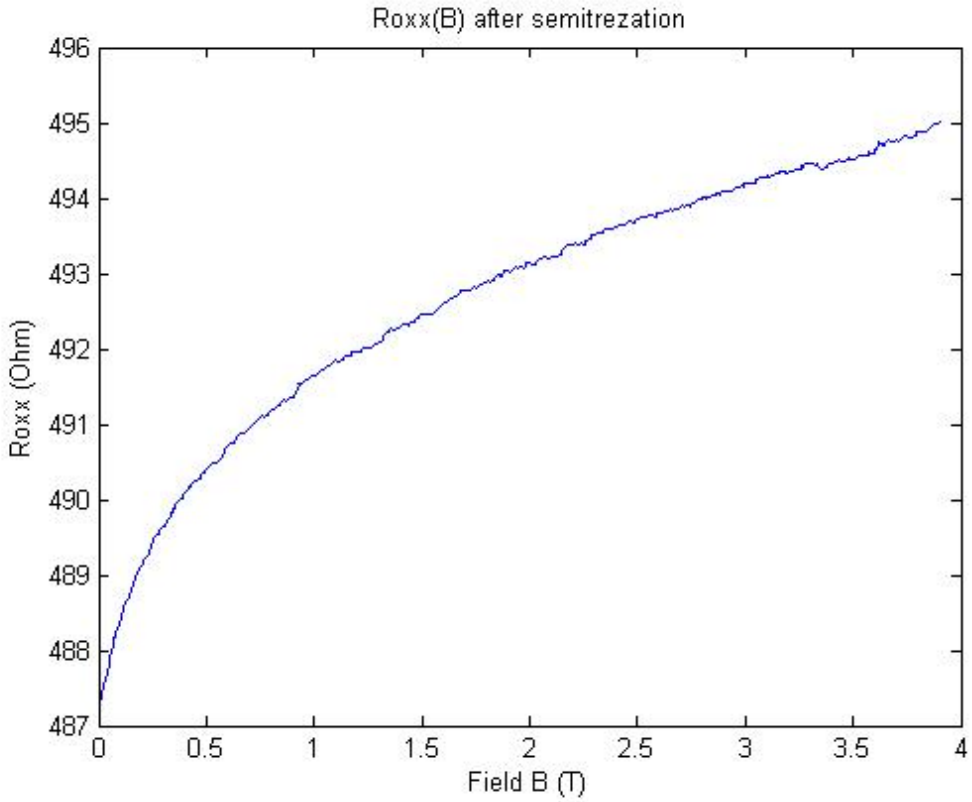

Figure 8: 4Kelvins Rx(B) after symetrization

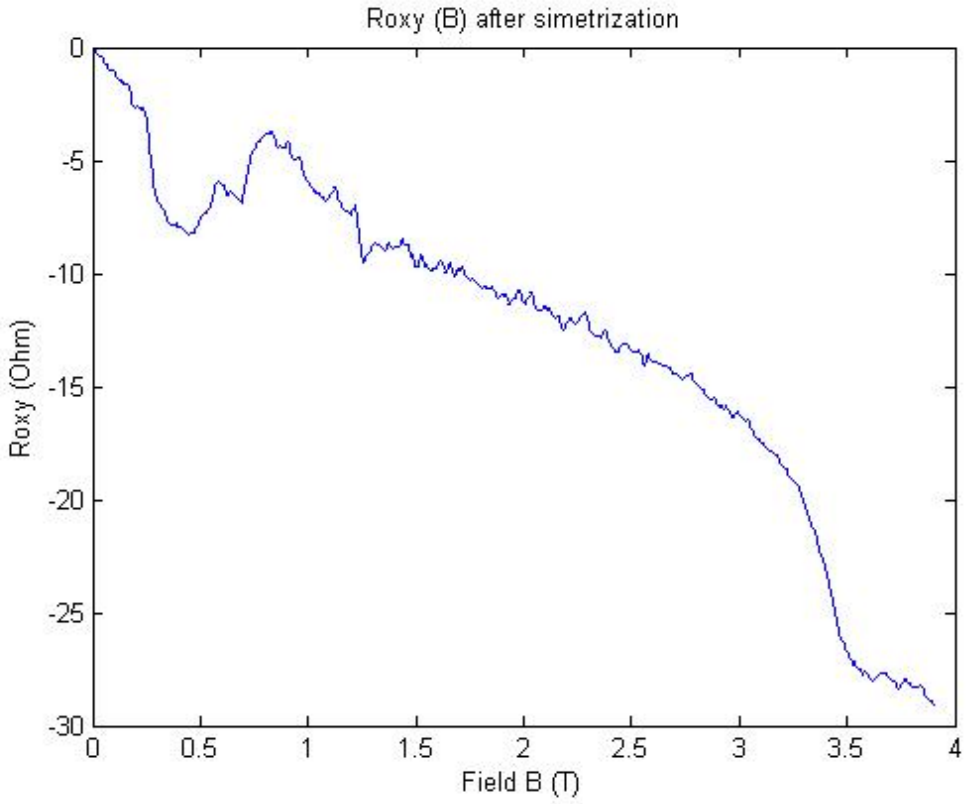

Figure 9: 4Kelvins Ry(B) after symetrization

4Kelv
$R_H = 6.123 \frac{Ohm}{T}$
$n = 1.02 * 10^{14} cm^{-2}$
$\mu = 0.0123 \frac{m^2}{V*s}$

8Kelv

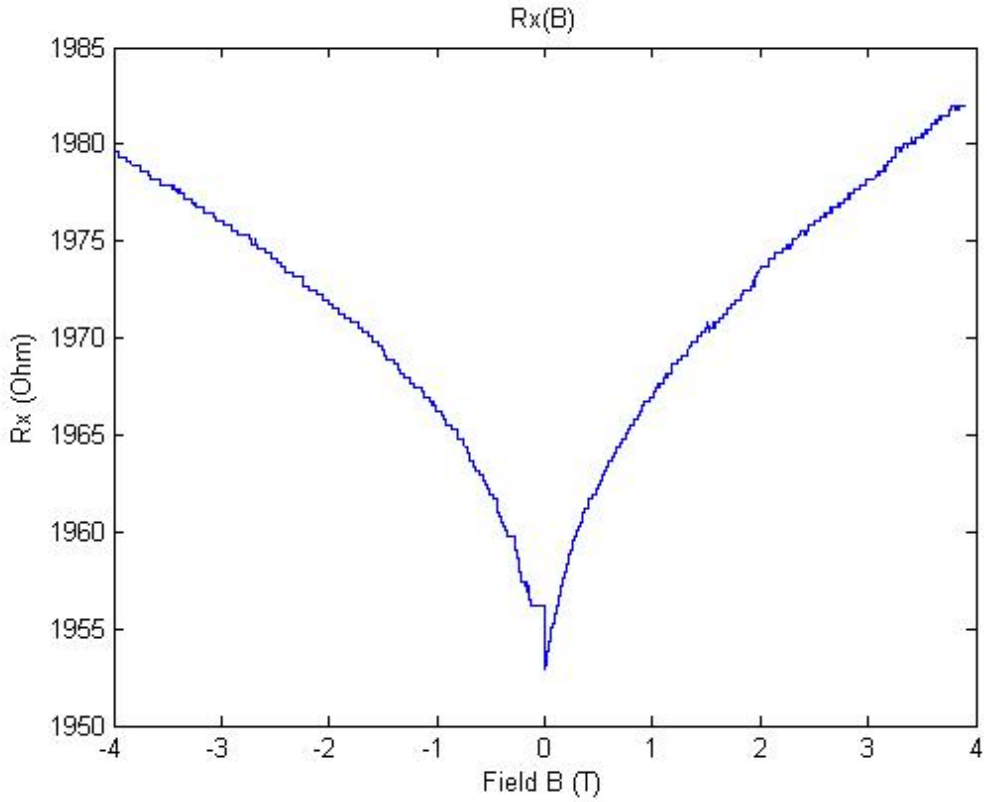

Figure 10: 8Kelvins Rx(B)

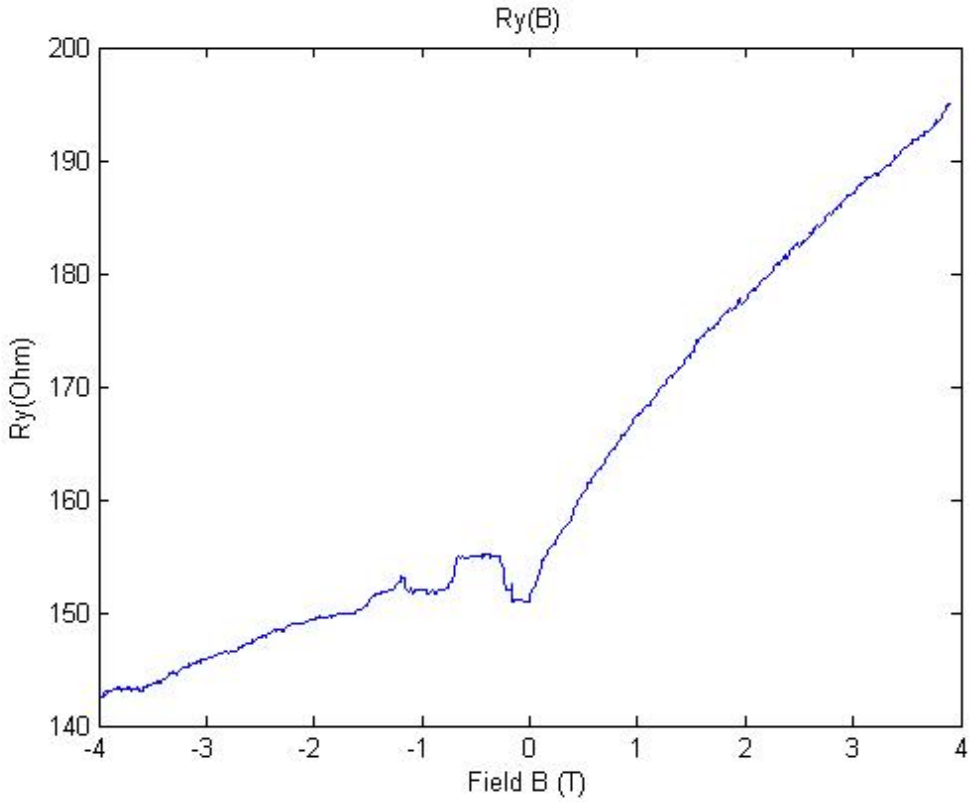

Figure 11: 8Kelvins Ry(B)

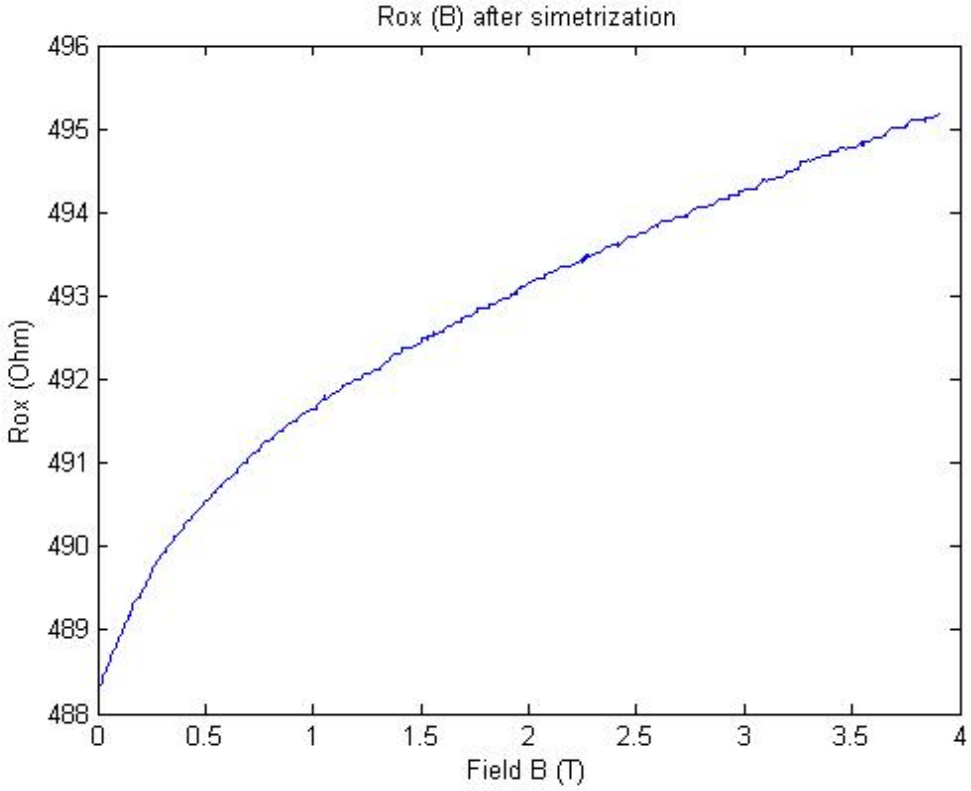

Figure 12: 8Kelvins Rx(B) after symetrization

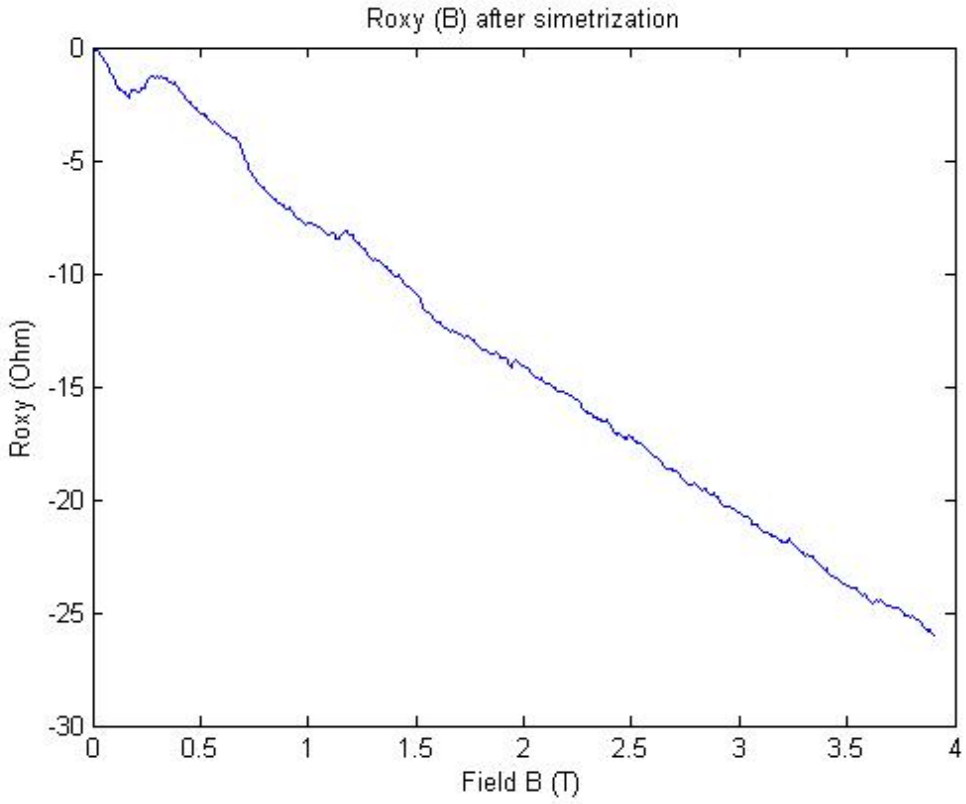

Figure 13: 8Kelvins Ry(B) after symetrization

8Kelv
$R_H = 6.7049 \frac{Ohm}{T}$
$n = 9.3 * 10^{13} cm^{-2}$
$\mu = 0.0135 \frac{m^2}{V*s}$

16Kelv

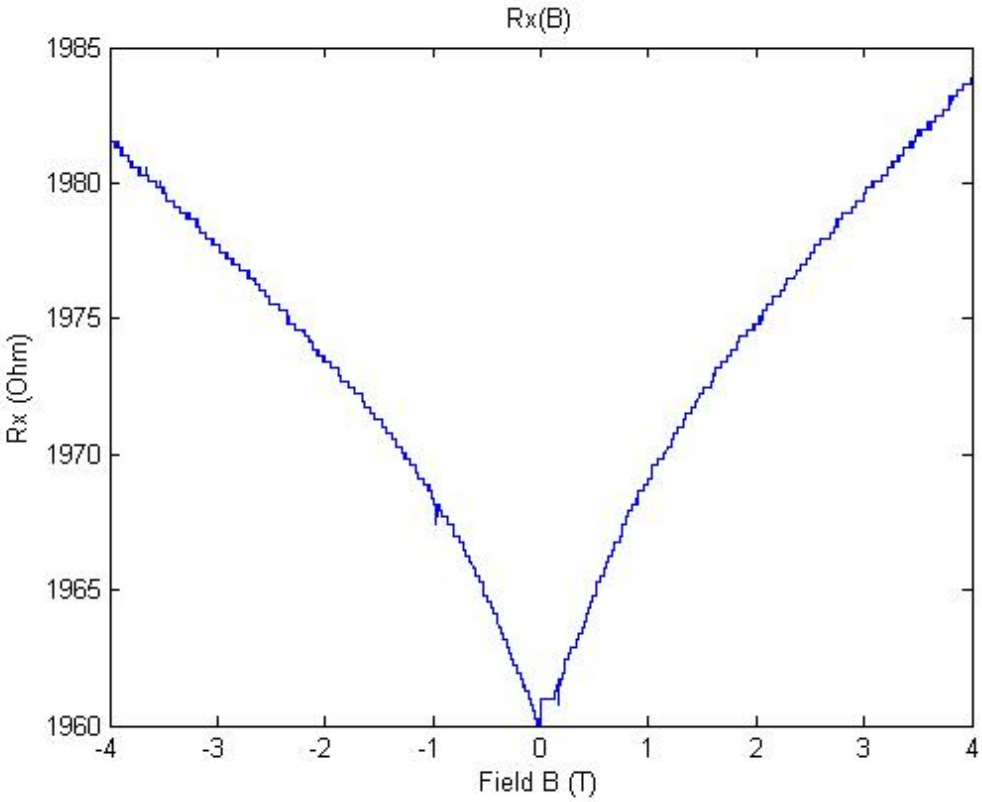

Figure 14: 16Kelvins Rx(B)

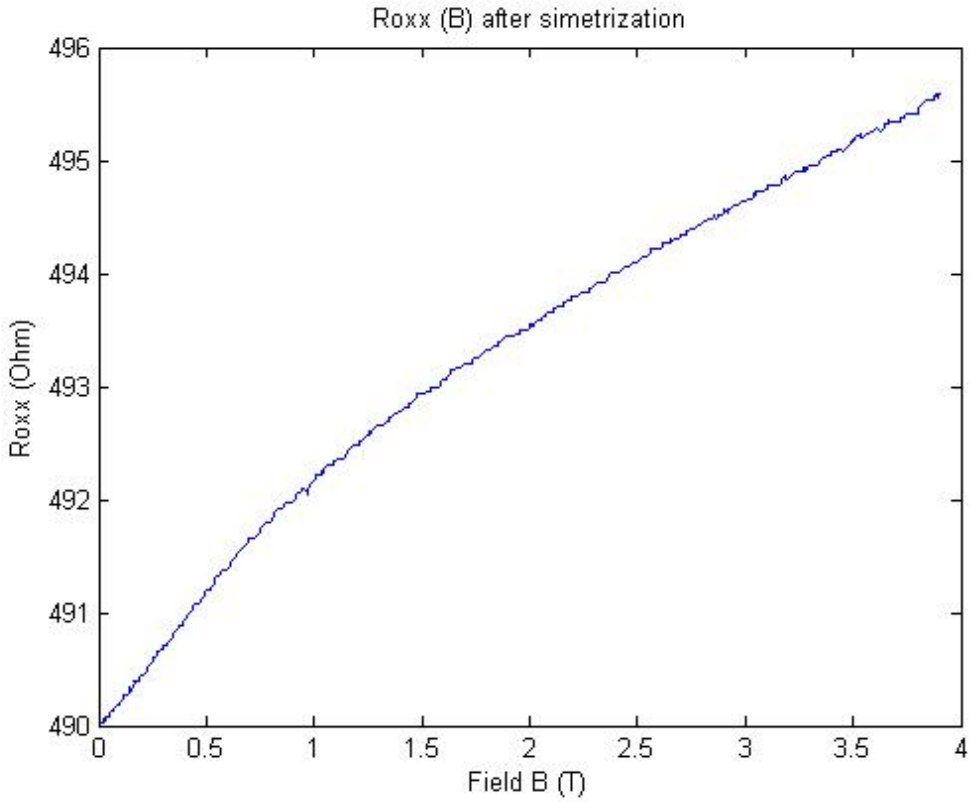

Figure 15: 16Kelvins Rx(B) after symetrization

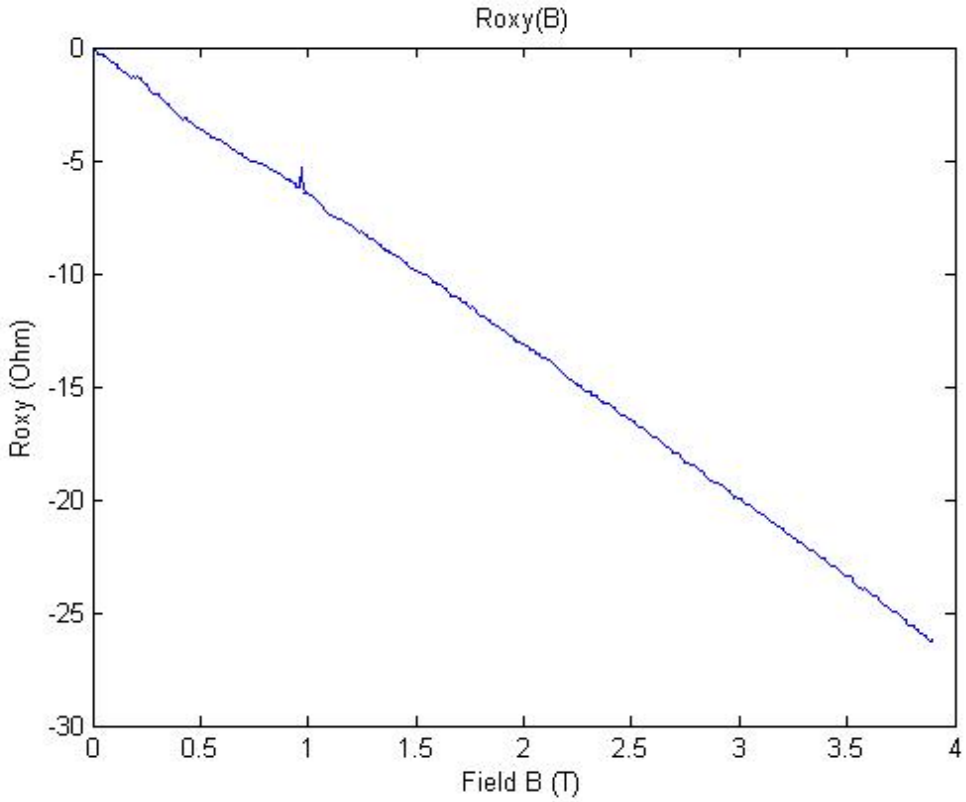

Figure 16: 16Kelvins Ry(B) after symetrization

16Kelv
$R_H = 6.6175 \frac{Ohm}{T}$
$n = 9.36 * 10^{13} cm^{-2}$
$\mu = 0.0135 \frac{m^2}{V*s}$

32Kelv

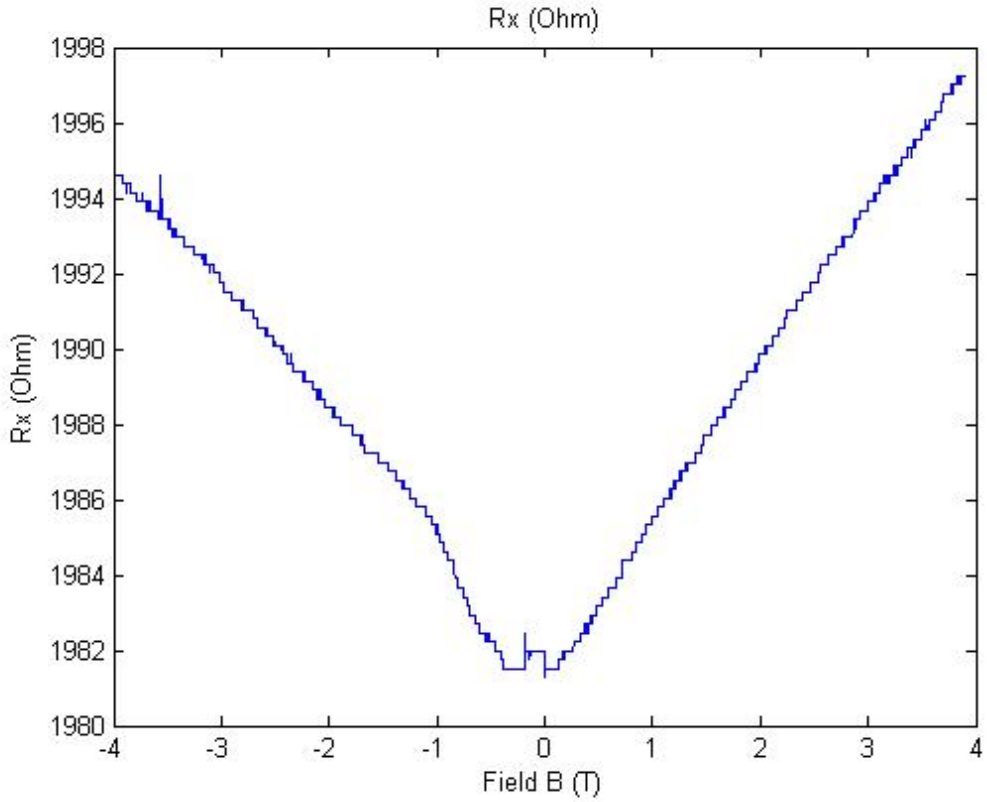

Figure 17: 32Kelvins Rx(B)

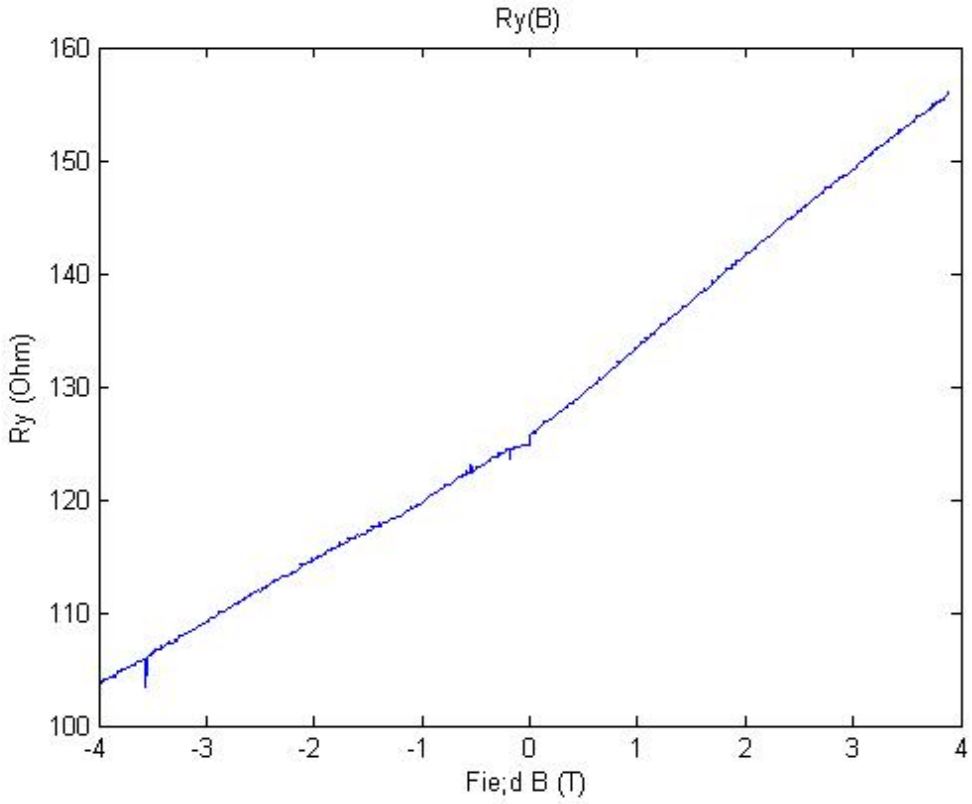

Figure 18: 32Kelvins Ry(B)

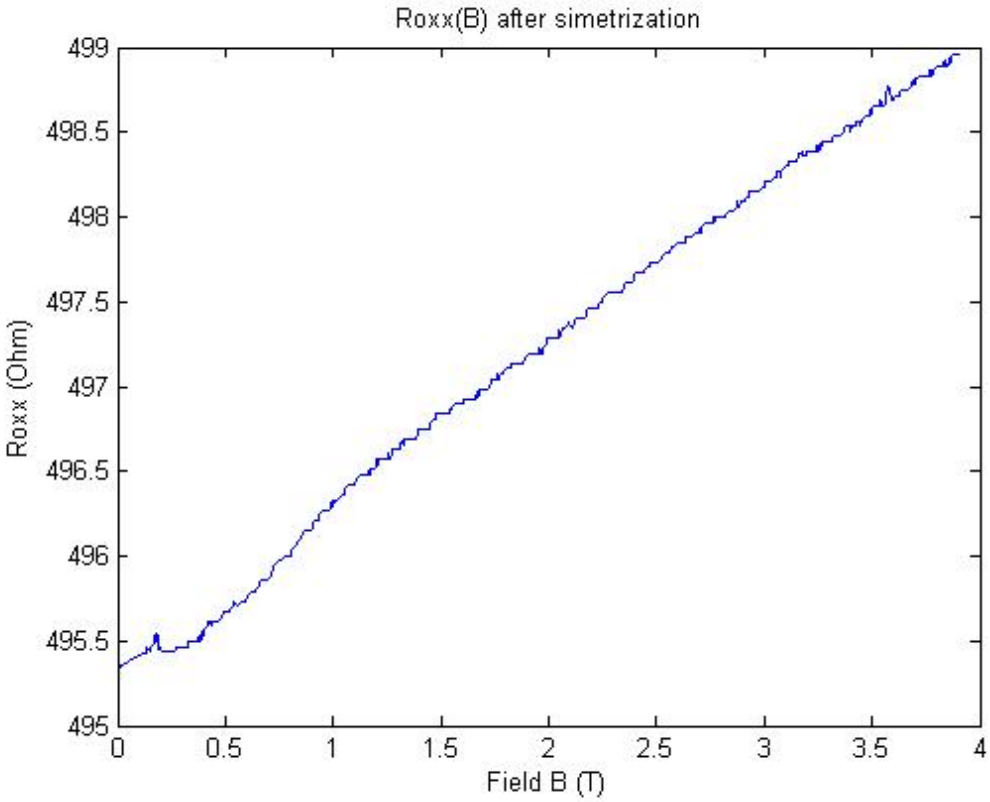

Figure 19: 32Kelvins Rx(B) after symetrization

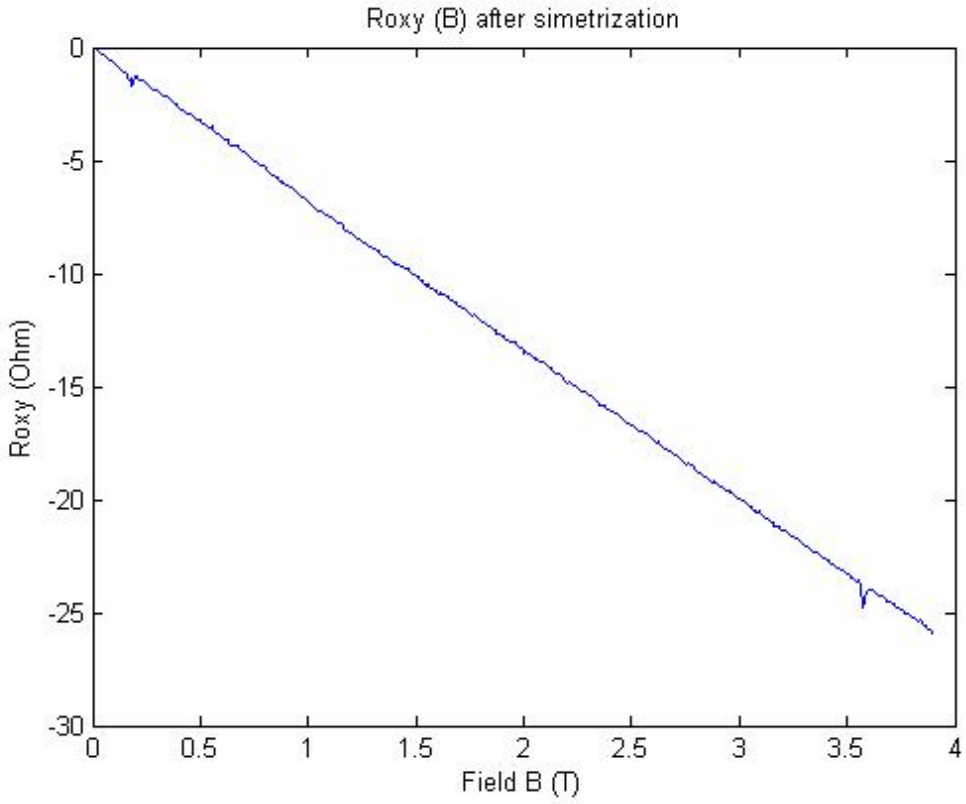

Figure 20: 32Kelvins Ry(B) after symetrization

32Kelv
$R_H = 6.6373 \frac{Ohm}{T}$
$n = 9.41 * 10^{13} cm^{-2}$
$\mu = 0.0133 \frac{m^2}{V*s}$

26, 28 March 2018, Transport measurements 747 Bi_2Se_3 doped with Sr

1 Sample 747

Resistor =1M Ohm Voltage 1V 8-11 current 10-12 rx 10-7 ry
The sample is putted into Cryogenic Transport Measurement System(CFMS) and field dependancies of Rxx and Rxy are measured with temperature 2,4,8,16,32Kelv. In the fig1. and fig2. the photo and scheme of sample contacts is presented. Current is aplied to contact 1 and 4 via resistor 1MOhm, the lockin voltage is 1V. We measure Rxx between contacts 2 and 3, Rxy between 2 and 6.

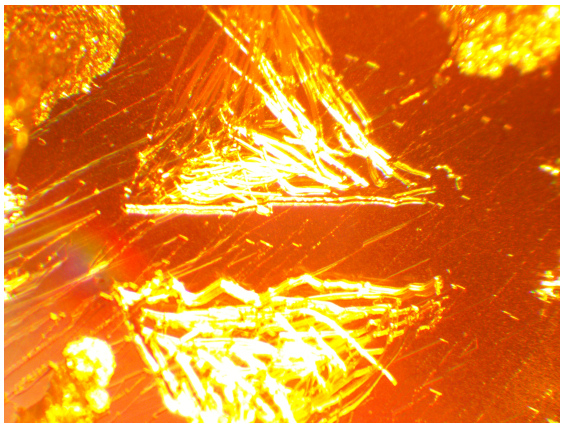

Figure 1: fig1. 747 Bi_2Se_3 sample

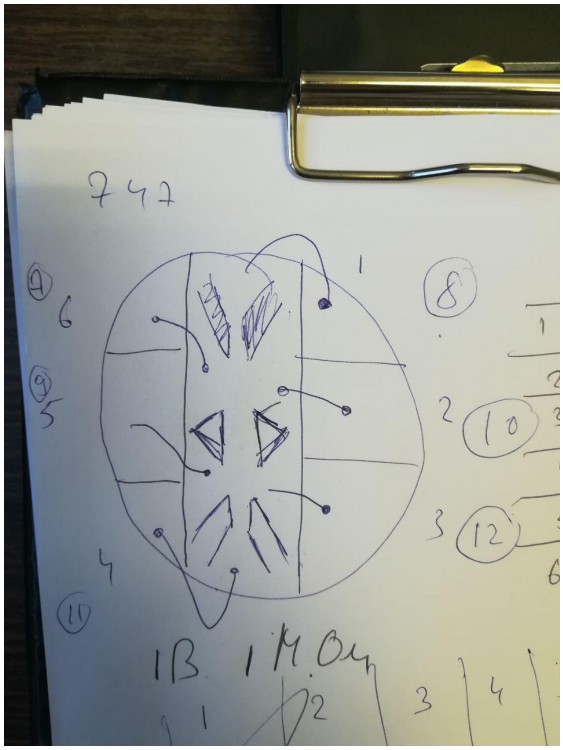

Figure 2: fig2. 746 Bi_2Se_3 sample schema

Geometrical parametr $\frac{S}{l} = 0.1759 \pm 0.014$

	1	**2**	**3**	**4**	**5**	**6**
1		21K Ohm	22.2K Ohm	20,7K Ohm	8.4K Ohm	8.1K Ohm
2	21.9K Ohm		7.9K Ohm	6.3K Ohm	21.8K Ohm	23.2K Ohm
3	22.7K Ohm	8.0K Ohm		3.9K Ohm	22.4K Ohm	24.7K Ohm
4	21,1K Ohm	6.5K Ohm	3.9K Ohm		20.9Kohm	22,3K Ohm
5	8.6K Ohm	21.6K Ohm	21.3K Ohm	20.3Kohm		6.5K Ohm
6	6.5K Ohm	23,5K Ohm	23,9K Ohm	22,4K Ohm	10.6K Ohm	

Table 1: Bi2Se3 (747) R b-w contacts

2 Measurements

List of measurements is dipslayed in table1.

File	Field	Temperature	Voltage	Comment
Field.sweep.4.lock.in26.03.1819.27.29	0T	from 240K to 2K	1V	OK
Field.sweep.4.lock.in26.03.1820.16.18	form -6T to 6T	2K	1V	OK
Field.sweep.4.lock.in26.03.1820.54.04	form 3T to -0.5	2K	1V	Com1
Field.sweep.4.lock.in28.03.1818.26.15	0T	from 290K to 2K	1V	Com1
Field.sweep.4.lock.in28.03.1819.51.28	from 2 to -2	2K	1V	Step=0.2T
Field.sweep.4.lock.in28.03.1820.15.04	from -2 to 2	2K	1V	Step=0.2T
Field.sweep.4.lock.in28.03.18	from 14 to -14	2K	1V	Step=0.4T
Field.sweep.4.lock.in28.03.1820.48.24	from -2 to 2	4K	1V	Step=0.2T
Field.sweep.4.lock.in28.03.1821.09.32	from 2 to -2	8K	1V	Step=0.2T
Field.sweep.4.lock.in28.03.1821.51.44	from -1.5 to 1.5	16K	1V	Step=0.2T
Field.sweep.4.lock.in28.03.1822.15.44	from 1.5 to -1.5	32K	1V	Step=0.2T

Table 2: Measurements and files

COM1: I have changed Rx= 10-12 Ry=9-12

3 Results

RRR=1.5

31 March 2018, Weak antilocalisation 746 Bi_2Se_3 doped with Sr

1 Theory

2 Measurements

We had problems with switching in the magnit cercuit, accoding to fix it the field step is decreased to 0.1T per minute. The circuit conditions are the saim as was in previous experiment.(R=1MOhm, V=1Volt) List of measurements is dipslayed in table1.

File	Field	Temperature	Voltage	Comment
Field.sweep.4.lock.in31.03.1814.07.07	from 2 to -2	2K	1V	0.2T/min
Field.sweep.4.lock.in31.03.1814.29.00	from -2 to 2	4K	1V	0.2T/min
Field.sweep.4.lock.in31.03.1815.06.18	from 2 to -2	8K	1V	0.2T/min
Field.sweep.4.lock.in31.03.1815.26.37	from -2 to 2	16K	1V	0.2T/min
Field.sweep.4.lock.in31.03.1816, 04, 07	from 2 to -2	32K	1V	0.2T/min

Table 1: Measurements and files

In order to understand how magnitoresistivity depends on temperature next measurements have been done:

File	Field	Temperature	Voltage	Comment
Field.sweep.4.lock.in31.03.1816.35.48	from -6 to 6	32K	1V	0.5T/min
Field.sweep.4.lock.in31.03.1817.20.22	from 6 to -6	16K	1V	0.5T/min
Field.sweep.4.lock.in31.03.1817.56.52	from -6 to 6	8K	1V	0.5T/min
Field.sweep.4.lock.in31.03.1818.30.56	from 6 to -6	4K	1V	0.5T/min
Field.sweep.4.lock.in31.03.1819.09.26	from -6 to 6	2K	1V	0.5T/min

Table 2: Measurements and files

3 Results

2Kelv

Temperature	α	$l_\varphi * 10^{-7}\mathbf{m}$
2	0.549	1.876
4	0.555	1.366
8	0.659	0.813
16	0.795	0.477
16	0.647	0.329

Table 3: WAL Results

??? 2018, Transport mesuarments SOT 400

1 SOT 400 sample

Sample from Ole. Photo
Geometrical parametr $\frac{S}{l} = 0. \pm 0.0$

	1	**2**	**3**	**4**	**5**	**6**
1		1.21K Ohm	33.6K Ohm	2.14K Ohm	1.63K Ohm	1.96K Ohm
2	1.21K Ohm		35.0K Ohm	1.9K Ohm	1.4K Ohm	1.7K Ohm
3	15.6K Ohm	10.8K Ohm		15.8K Ohm	30.3K Ohm	10.2K Ohm
4	3.5K Ohm	2.5K Ohm	32K Ohm		1.5K Ohm	1.8K Ohm
5	1.6K Ohm	1.4K Ohm	54.0K Ohm	1.4K Ohm		1.2K Ohm
6	1.8K Ohm	1.6K Ohm	102K Ohm	1.8K Ohm	1.2K Ohm	

Table 1: SOT400 R b-w contacts

2 SOT 400 measurements

3 April 2018, Transport measurements 757A Bi_2Se_3 doped with Sr

1 Sample 757

Geometrical parametr $\frac{S}{l} = 0.176$

2 Measurements

List of measurements is dipslayed in table1.

File	Field	Temperature	Voltage	Comment
Field.sweep.4.lock.in03.04.1821.58.20	from 10T to 0T	2K	1V	0.5T/min
Field.sweep.4.lock.in03.04.1823.45.47	from 6 to -6T	2K	1V	0.5T/min
Field.sweep.4.lock.in04.04.18	from -6 to 6T	2K	1V	0.5T/min
Field.sweep.4.lock.in04.04.1800.51.20	from -6 to 6T	2K	1V	0.5T/min
Field.sweep.4.lock.in04.04.1801.32.27	from 2T to -2T	2K	1V	0.2T/min
Field.sweep.4.lock.in04.04.1802.36.54	from -6T to 6T	4K	1V	0.5T/min
Field.sweep.4.lock.in04.04.1803.07.07	from 6T to 0T	4K	1V	0.5T/min
Field.sweep.4.lock.in04.04.1802.03.54	from 2T to -2T	4K	1V	0.2T/min
Field.sweep.4.lock.in04.04.1803.38.07	from -6T to 6T	8K	1V	0.5T/min
Field.sweep.4.lock.in04.04.1804.22.10	from 2T to -2T	8K	1V	0.2T/min
Field.sweep.4.lock.in04.04.1805.05.47	from -6T to 6T	16K	1V	0.5T/min
Field.sweep.4.lock.in04.04.18	from 2T to -2T	16K	1V	0.2T/min
Field.sweep.4.lock.in04.04.1805.45.38	from -6T to 6T	32K	1V	0.5T/min
Field.sweep.4.lock.in04.04.18	from 2T to -2T	32K	1V	0.2T/min

Table 1: Measurements and files

3 Results

RRR=1.64
2Kelv
$R_H = 13.43\frac{Ohm}{T}$

$n = 4.65 * 10^{13} cm^{-2}$
$\mu = 0.0681 \frac{m^2}{V*s}$

4Kelv
$R_H = 13.42 \frac{Ohm}{T}$
$n = 4.66 * 10^{13} cm^{-2}$
$\mu = 0.0682 \frac{m^2}{V*s}$

8Kelv
$R_H = 13.34 \frac{Ohm}{T}$
$n = 4.69 * 10^{13} cm^{-2}$
$\mu = 0.0680 \frac{m^2}{V*s}$

16Kelv
$R_H = 13.28 \frac{Ohm}{T}$
$n = 4.71 * 10^{13} cm^{-2}$
$\mu = 0.0677 \frac{m^2}{V*s}$

32Kelv
$R_H = 13.27 \frac{Ohm}{T}$
$n = 4.71 * 10^{13} cm^{-2}$
$\mu = 0.0673 \frac{m^2}{V*s}$

5 April 2018, Transport measurements 761D Bi_2Se_3 covered with Sr

1 Sample 761D

Geometrical parametr $\frac{S}{l} = 0.336$

2 Measurements

List of measurements is dipslayed in table1.

File	Field	Temperature	Voltage	Comment
Field.sweep.4.lock.in05.04.1818.14.47	0T	from 300K to2K	1V	Ok
Field.sweep.4.lock.in05.04.1819.49.05	from 2 T to-2T	2K	1V	0.2T/min
Field.sweep.4.lock.in05.04.1820.15.33	from 2 T to-1.5T	2K	1V	0.1T/min
Field.sweep.4.lock.in05.04.1820.51.06	from -2 T to 2T	4K	1V	0.2T/min
Field.sweep.4.lock.in05.04.18	from 2 T to -2T	8K	1V	0.2T/min
Field.sweep.4.lock.in05.04.18	from -2 T to 2T	16K	1V	0.2T/min
Field.sweep.4.lock.in05.04.18	from -2 T to 2T	32K	1V	0.2T/min

Table 1: Measurements and files

3 Results

RRR=1.22
2Kelv
$R_H = 11.93\frac{Ohm}{T}$
$n = 5.23 * 10^{13} cm^{-2}$
$\mu = 0.0049\frac{m^2}{V*s}$

4Kelv
$R_H = 9.89\frac{Ohm}{T}$
$n = 6.3 * 10^{13} cm^{-2}$

$\mu = 0.0040 \frac{m^2}{V*s}$

8Kelv
ABrakadabra Ry(B)=const

16Kelv
ABrakadabra Ry(B)=const

32Kelv
ABrakadabra Ry(B)=const

10 April 2018, Transport measurements 761D Bi_2Se_3 after Annealing

1 Sample 761DAnnealed

1V frough 1 Mohm l/w=3.1 Problems with temperature

2 Measurements

List of measurements is dipslayed in table1.

File	Field	Temperature	Voltage	Comment
Field.sweep.4.lock.in10.04.1820.06.51	0T	from 300K to2K	1V	Ok
Field.sweep.4.lock.in10.04.1821.34.04	from -6T to 6T	2K	1V	0.5T/min
Field.sweep.4.lock.in10.04.1822.07.59	from 6T to -6T	4K	1V	0.5T/min
Field.sweep.4.lock.in10.04.1822.34.14	from 6T to -6T	4K	1V	0.5T/min
Field.sweep.4.lock.in10.04.18	from -6T to 6T	8K	1V	Errrr
Field.sweep.4.lock.in11.04.1810.53.50	from 6T to -6T	16K	1V	0.5T/min
Field.sweep.4.lock.in11.04.1800_19_39	from -6T to 6T	32K	1V	0.5T/min
Field.sweep.4.lock.in11.04.18	from 2T to -2T	2K	1V	Errrr
Field.sweep.4.lock.in11.04.18	from -2T to 2T	4K	1V	Errrr
Field.sweep.4.lock.in11.04.18	from 2T to -2T	8K	1V	Errrr
Field.sweep.4.lock.in11.04.18	from -2T to 2T	16K	1V	Errrr
Field.sweep.4.lock.in10.	from 2T to -2T	32K	1V	Errrr
Field.sweep.4.lock.in10.04.18	from -12T to 12T	32K	1V	Errrr

Table 1: Measurements and files

3 Results

RRR=1.38
2Kelv
$R_H = 7.81\frac{Ohm}{T}$
$n = 8 * 10^{13} cm^{-2}$
$\mu = 0.0279\frac{m^2}{V*s}$

32Kelv
$R_H = 7.76\frac{Ohm}{T}$
$n = 8,1 * 10^{13} cm^{-2}$
$\mu = 0.0293\frac{m^2}{V*s}$

17 April 2018, Transport measurements 761D Bi_2Se_3 after Annealing 300K

1 Sample 761DAnnealed 300K

1V frough 1 Mohm l/w=6.1 Problems with temperature

2 Measurements

List of measurements is dipslayed in table1.

File	Field	Temperature	Voltage	Comment
Field.sweep.4.lock.in17.04.1811.56.39	0T	from 300K to2K	1V	Ok
Field.sweep.4.lock.in17.04.1812.53.41	-2T to 2T	32K	1V	0.2T/min
Field.sweep.4.lock.in17.04.1813.29.13	2T to -2T	16K	1V	0.2T/min
Field.sweep.4.lock.in17.04.1813.58.28	-2T to 2T	8K	1V	0.2T/min
Field.sweep.4.lock.in17.04.1815.00.30	2T to -2T	4K	1V	0.2T/min
Field.sweep.4.lock.in17.04.1815.33.45	2T to -2T	2K	1V	0.2T/min
Field.sweep.4.lock.in17.04.1817.23.32	6T to -6T	32K	1V	0.5T/min
Field.sweep.4.lock.in17.04.1818.30.29	-6T to 6T	2K	1V	0.5T/min

Table 1: Measurements and files

3 Results

RRR=1.38

2Kelv
$R_H = 2.88\frac{Ohm}{T}$
$n = 2.17 * 10^{14} cm^{-2}$
$\mu = 0.0082\frac{m^2}{V*s}$

4Kelv
$R_H = 2.87\frac{Ohm}{T}$

$n = 2.18 * 10^{14} cm^{-2}$
$\mu = 0.0082 \frac{m^2}{V*s}$

8Kelv
$R_H = 2.85 \frac{Ohm}{T}$
$n = 2.19 * 10^{14} cm^{-2}$
$\mu = 0.0082 \frac{m^2}{V*s}$

21,22 April 2018, Transport measurements 761A and 746A Bi_2Se_3

1 Sample 761A and 746A

761A l/w=5.7254
746A l/w=3.5245
AUX1 10V -300K 0V –0K
AUX2 10V 1T 0V 0T
761A and 746A

	3	**4**	**5**	**6**	**7**	**9**
3		8.9K Ohm	5.2K Ohm	6.9K Ohm	7.1K Ohm	4.7K Ohm
4			7.1K Ohm	3.8K Ohm	3.9K Ohm	6.8K Ohm
5				5.2K Ohm	5.3K Ohm	3.3K Ohm
6					2.2K Ohm	4.9K Ohm
7						5.0K Ohm
9						

Table 1: 761A R b-w contacts

	8	**10**	**11**	**12**	**13**	**14**
8		14.5K Ohm	13.7K Ohm	14.2K Ohm	14.9K Ohm	16.5K Ohm
10			8.3K Ohm	5.5K Ohm	8.4K Ohm	8.3K Ohm
11				6.2K Ohm	7.0K Ohm	9.1K Ohm
12					7.0K Ohm	6.6K Ohm
13						9.2K Ohm
14						

Table 2: 746A R b-w contacts

2 Measurements

List of measurements is dipslayed in table1.

File	Field	Temperature	Voltage	Comment
data21.04.1813.27.05	-1T to 1T	300K	1V	50 Oe/sec
data21.04.1814.03.17	1T to -1T	100K	1V	50 Oe/sec
data21.04.1814.19.56	-1T to 1T	77K	1V	50 Oe/sec
data21.04.1814.47.12	1T to -1T	32K	1V	50 Oe/sec
data21.04.1814.56.128	-1T to 1T	16K	1V	50 Oe/sec
data21.04.1815.12.28	1T to -1T	8K	1V	50 Oe/sec
data21.04.1815.27.38	-1T to 1T	4K	1V	50 Oe/sec
data21.04.1815.43.51	1T to -1T	2K	1V	50 Oe/sec
data21.04.1816.19.15	0T	from 2K to 300K	1V	50 Oe/sec
data22.04.1812.39.45	0T	from 300K to 400K	1V	*
data22.04.1812.39.45	-1¡-¿1T	400K	1V	50 Oe/s multy
data22.04.1813.58.39	from -1Tto 1T	300K	1V	50 50e/s
data22.04.1815.08.31	from -1Tto 1T	100K	1V	50 50e/s
data22.04.1815.20.12	from -1Tto 1T	77K	1V	50 50e/s
data22.04.1815.35.18	from -1Tto 1T	32K	1V	50 50e/s
data22.04.1815.52.34	from -1Tto 1T	16K	1V	50 50e/s
data22.04.1816.06.49	from -1Tto 1T	8K	1V	50 50e/s
data22.04.1816.20.14	from -1Tto 1T	4K	1V	50 50e/s
data22.04.1816.35.17	from -1Tto 1T	2K	1V	50 50e/s
data22.04.1817.10.37	from 0T	from 2K to 300K	1V	50 50e/s

Table 3: Measurements and files

*-problems with voltmeter the right temperature is only after 340K!

3 Results for 761A befor annealing

RRR=1.47

2Kelv
$R_H = 15.79\frac{Ohm}{T}$
$n = 3.95 * 10^{13} cm^{-2}$
$\mu = 0.\frac{m^2}{V*s}$

4Kelv
$R_H = \frac{Ohm}{T}$
$n = *10^{14} cm^{-2}$
$\mu = 0.\frac{m^2}{V*s}$

8Kelv
$R_H = \frac{Ohm}{T}$
$n = *10^{14} cm^{-2}$
$\mu = 0.\frac{m^2}{V*s}$

Formulae and Media Recipes

CFMS

REMOVING THE PROBE STAGES:
1.Switch on rotary pump and wiper seal untill pick uping insert.
2. When insert bottom is in the top close gate.
3. Close wiper seaql and rotary pump.
4. Open Airlock and vent.
5. Open venting valve.
4. Close everything except OIl free PUMP.

INSERTING THEPROBE STAGES:.
1. Put probe.
2. On rotary pump, viper seal and irlock, wait 10 minutes.
3. Close irlock.
4. Open Gate.
5. Insert probe.
6. Close wiper seal and rotary pump.

Formulae

Formula 1 - Pythagorean theorem

$a^2 + b^2 = c^2$