Anhang

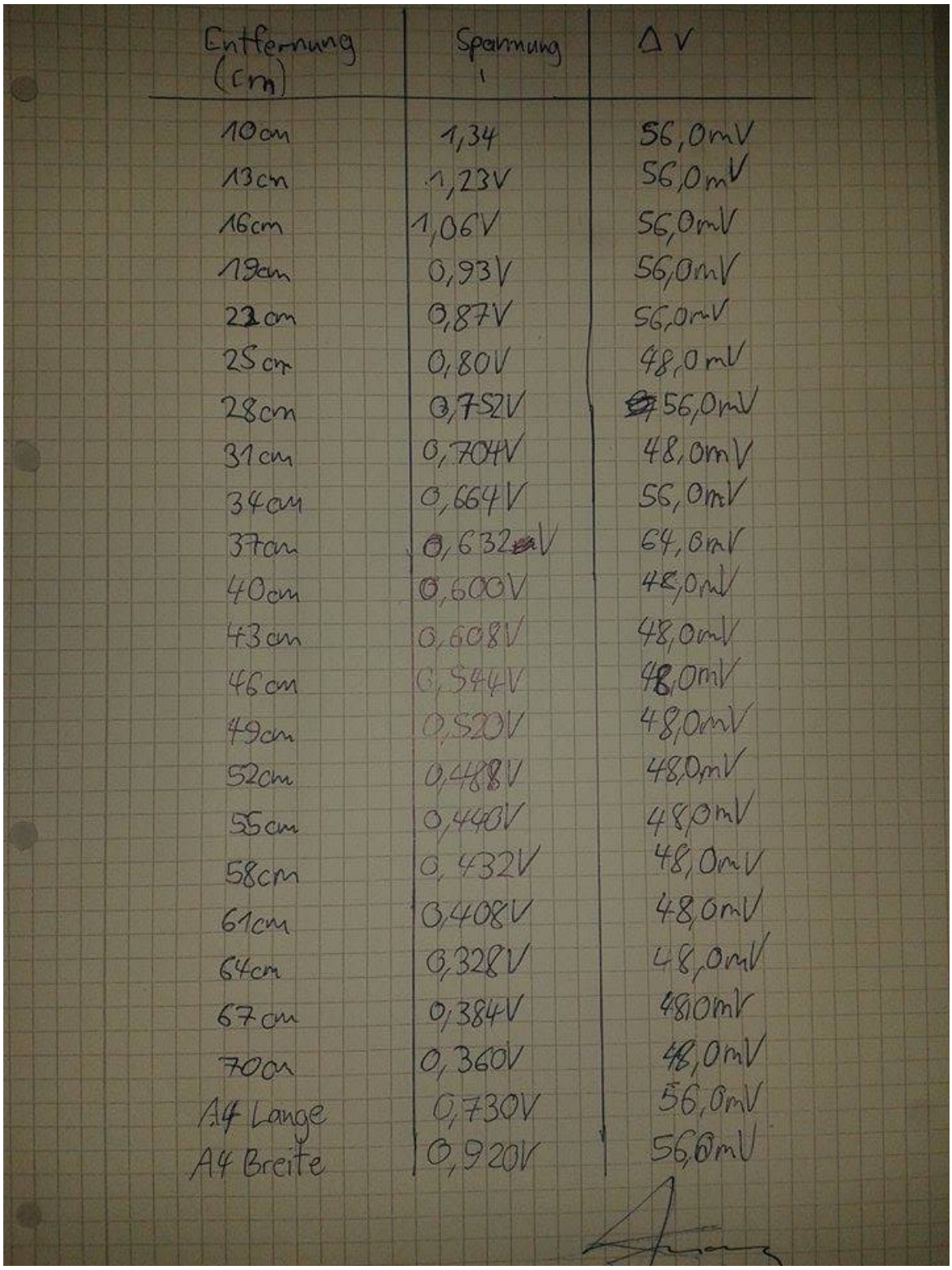
1.1 Quellcode

```
# -*- coding: utf-8 -*-
"""
Spyder Editor

This is a temporary script file.
"""
from numpy import arange
import matplotlib.pyplot as plt
from scipy import stats
import numpy as np

mean = []
x = []

for num in range(10,73,3):
    print('range:'+str(num)+'cm')
    val=np.genfromtxt(str(num) + 'cm.csv',delimiter=',',
       usecols=(4,4))
    print('mean: '+ str(np.mean(val)) + 'V')
    mean.append(np.mean(val))
    lnval = np.log(mean)
    dev = np.std(val)
    print('devation:'+str(dev)+'V'+'\n')
```

```
    #lineare regression
x = arange(10,73,3)
slope, intercept, r_value, p_value, std_err  = stats.
    linregress(x, lnval)
line = slope*x+intercept
finalf = np.exp(slope*(x)+intercept)

    #Fehlerberechnung
width=np.genfromtxt('width.csv',delimiter=',',usecols=(4,4))
length=np.genfromtxt('length.csv',delimiter=',',usecols=(4,4)
    )

mwidth=np.mean(width)
mlength=np.mean(length)

stdwidth=np.std(width)
stdlength=np.std(length)

dwidth95=stdwidth*1.96
dlength95=stdlength*1.96

fwidth=((np.log(mwidth)/slope)-intercept/slope)
fdwidth68=(stdwidth/mwidth)*fwidth
fdwidth95=(dwidth95/mwidth)*fwidth

flength=((np.log(mlength)/slope)-intercept/slope)
fdlength68=(stdlength/mlength)*flength
fdlength95=(dlength95/mlength)*flength


print('length:'+'\n''voltage'+str(mlength)+'V\n'+'deltaV␣
    68%(+-):'+
str(stdlength)+'V\n' +'deltaV␣95%(+-):'+str(dlength95)+'V\n''
    length:'+str(flength)+'cm␣\n'
```

```
+'delta_length 68%(+-):' +str(fdlength68)+'cm \n'+'
    delta_length 95%(+-):'+str(fdlength95)+'cm \n')

print('width:'+'\n''voltage'+str(mwidth)+'V\n'+'deltaV
    68%(+-):'+
str(stdwidth)+'V\n' +'deltaV 95%(+-):'+str(dwidth95)+'V\n''
    width:'+str(fwidth)+'cm \n'
+'delta_width 68%(+-):' +str(fdwidth68)+'cm \n'+'delta_width
    95%(+-):'+str(fdwidth95)+'cm \n')

    #Flaechenberechnung
area=flength*fwidth
area68=np.sqrt((flength*fdwidth68)**2+(fwidth*fdlength68)**2)
area95=np.sqrt((flength*fdwidth95)**2+(fwidth*fdlength95)**2)
print('Area:'+str(area)+'cm^2')
print('delta 68%(+-):'+str(area68)+'cm^2')
print('delta 95%(+-):'+str(area95)+'cm^2')




    #plotting commands
#plt.plot(val)
#plt.plot(mean,x,'o',mean,x,'r-')
#plt.plot(lnval,x,'o',line,x,'r-')
#plt.plot(finalf,x)
#plt.plot(finalf,x,'r-',mean,x,'o')
```

1.2 Messergebnisse



Entfernung (cm)	Spannung	ΔV
10cm	1,34	56,0mV
13cm	1,23V	56,0mV
16cm	1,06V	56,0mV
19cm	0,93V	56,0mV
22cm	0,87V	56,0mV
25cm	0,80V	48,0mV
28cm	0,752V	56,0mV
31cm	0,704V	48,0mV
34cm	0,664V	56,0mV
37cm	0,632V	64,0mV
40cm	0,600V	48,0mV
43cm	0,608V	48,0mV
46cm	0,544V	48,0mV
49cm	0,520V	48,0mV
52cm	0,488V	48,0mV
55cm	0,440V	48,0mV
58cm	0,432V	48,0mV
61cm	0,408V	48,0mV
64cm	0,328V	48,0mV
67cm	0,384V	48,0mV
70cm	0,360V	48,0mV
A4 Länge	0,730V	56,0mV
A4 Breite	0,920V	56,0mV

Abbildung 1.1: Messprotokoll