南京邮电大学
Nanjing University of Post & Telecom

# 物理实验教学中心

Physics Expeiment Center

# Measurement of electrodynamic potential using 11-cord potential difference meter

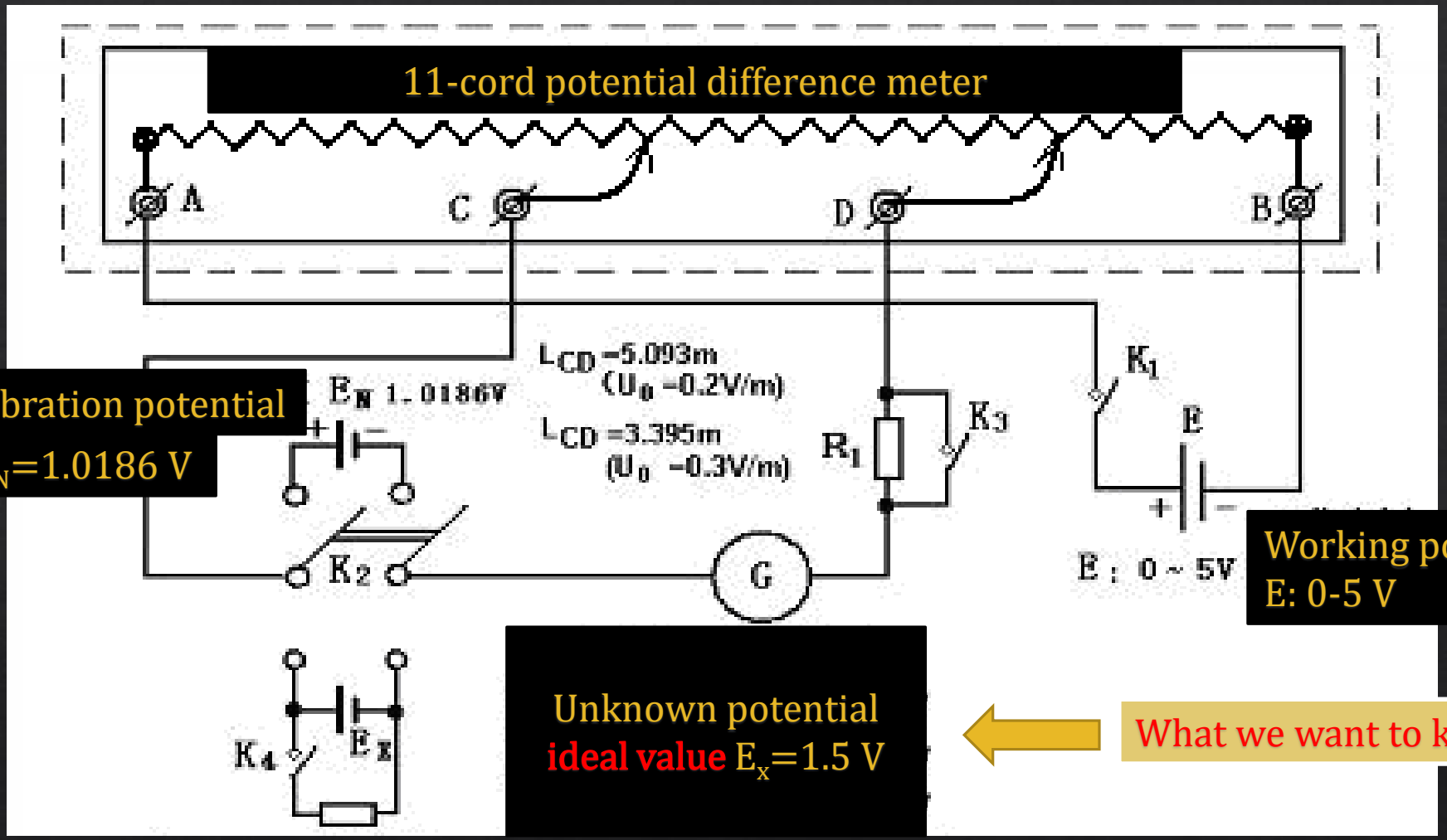
Li Bin

NJUPT

# Purposes:

1. Know the compensation method.
2. Learn to use 11-cord potential difference meter
3. Measure the electrodynamic potential (electric voltage).

# Circuit Diagram




Calibration potential

$E_N$=1.0186 V

Working power source

E: 0-5 V

Unknown potential

ideal value $E_x$=1.5 V

What we want to know

$E_N = U_{CD} = U_0 * L_{CD}$, $U_0$ is called correction factor, $L_{CD}$ is the length of the resistance wire between C & D.

$E_x = U_{CDx} = U_0 * L_{CDx}$. $E_N$ is known, if we know $L_{CD}$ and $L_{CDx}$ , we can obtain $E_x$.

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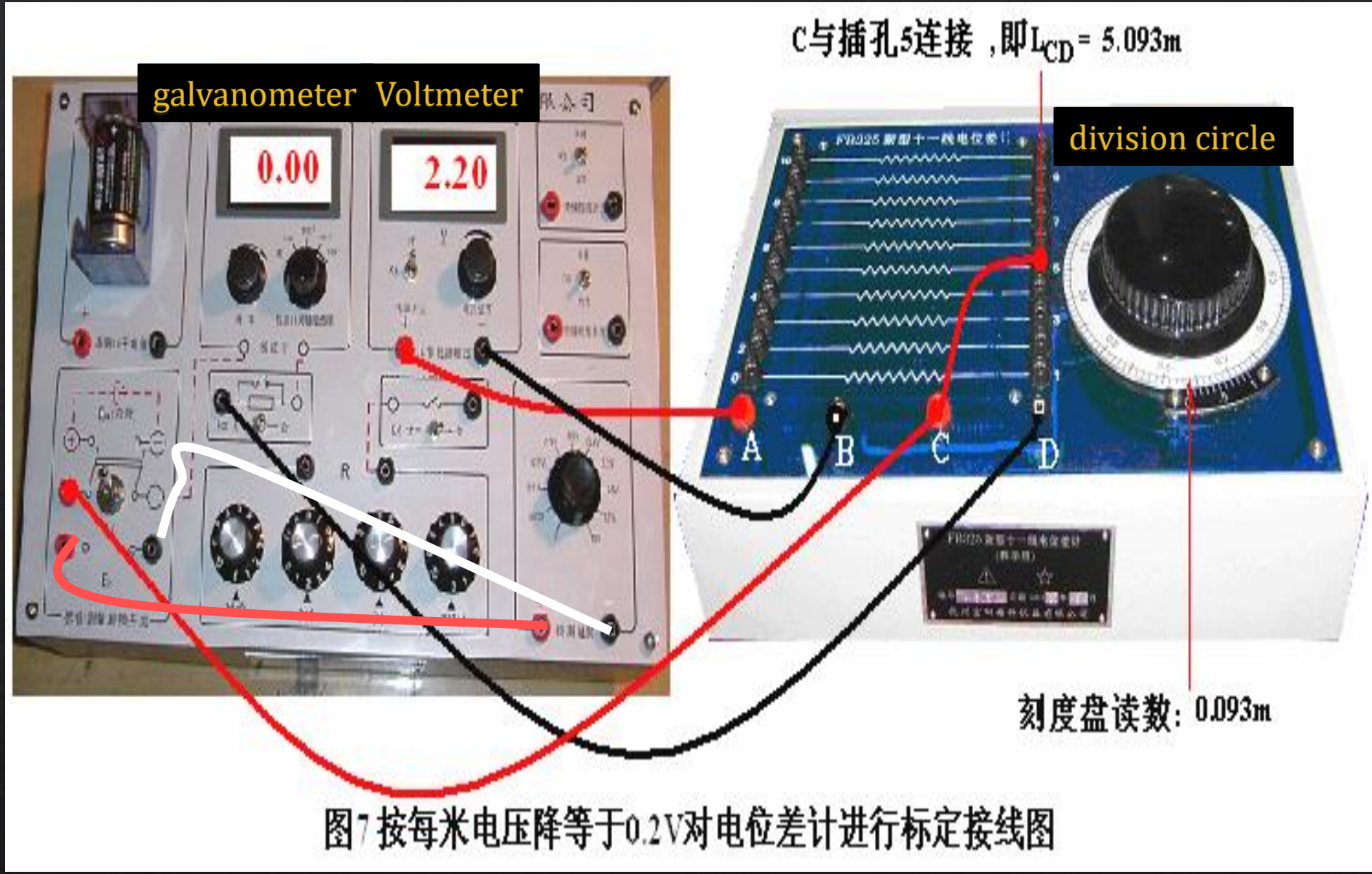


图7 按每米电压降等于0.2V对电位差计进行标定接线图

## Steps:

1. Connect circuit;
2. Galvanometer zero adjustment;
3. Calculate $L_{CD}$ for correction factor $U_0 = 0.2$ V/m, using $L_{CD} = E_N/U_0 = 1.0186/0.2 = 5.093$ m;
4. Regulate the length of CD to $L_{CD}$, adjust the voltage to make galvanometer displaying 0 at $10^{-8}$ gear;
5. Calculate the ideal $L_{CDx}$ for correction factor $U_0 = 0.2$ V/m, using $L_{CDx} = E_x/U_0 = 1.5/0.2 = 7.5$ m;
6. Keep the voltage unchanged, adjust the length of CD to make galvanometer displaying 0 at $10^{-8}$ gear. Record the measured $L_{CDx}$;
7. Calculate the actual value of $E_x = L_{CDx} * U_0$;
8. Change $U_0$ to 0.3 V/m, redo 3-7 steps.

| $U_0$ /(V/m) | E (voltmeter) /V | $L_{CD}$ (calculated) /m | $L_{CDx}$ (measured) /m | $E_x$ /V |
|---|---|---|---|---|
| 0.2 | | | | |
| 0.3 | | | | |

$$E_x = L_{CDx} * U_0$$

# END