-Positronentrapping-

Einfangen von e^+ im 1T-Magnet des AEgIS Experiments

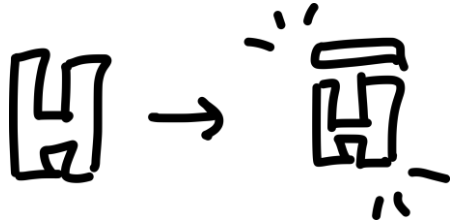
Benjamin Heusler

- 1928 e^+ postuliert
- gleiche Eigenschaften
- invertierte Ladung
- annihiliert mit Materieregegenstück

-AEgIS-

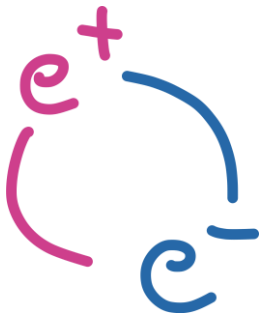
(Antimatter Experiment: Gravity, Interferometry, Spectroscopy)

- Teil der Experimente der Antimatterfactory
- Gravitationswirkung auf Antimaterie bestimmen
- Antiwasserstoff (Hbar)

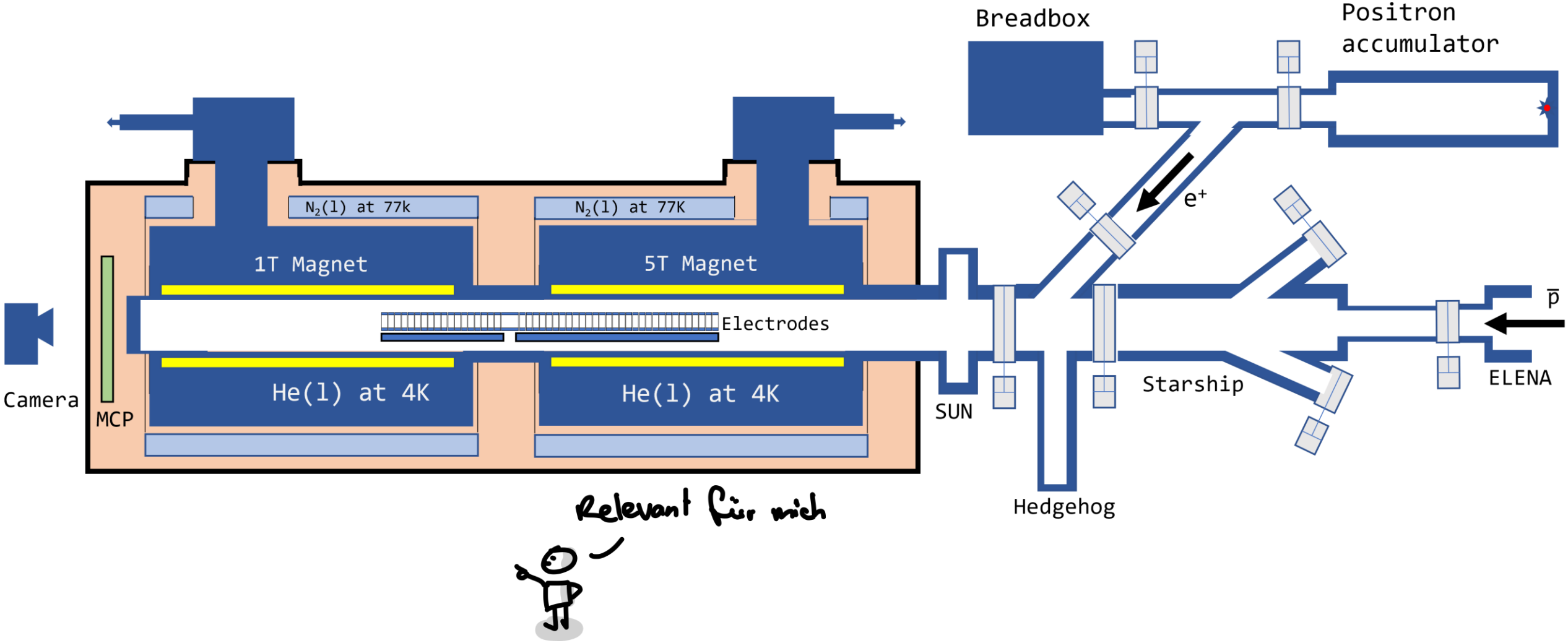


- Hbar = Antiproton (p^-) + Positron (e^+)

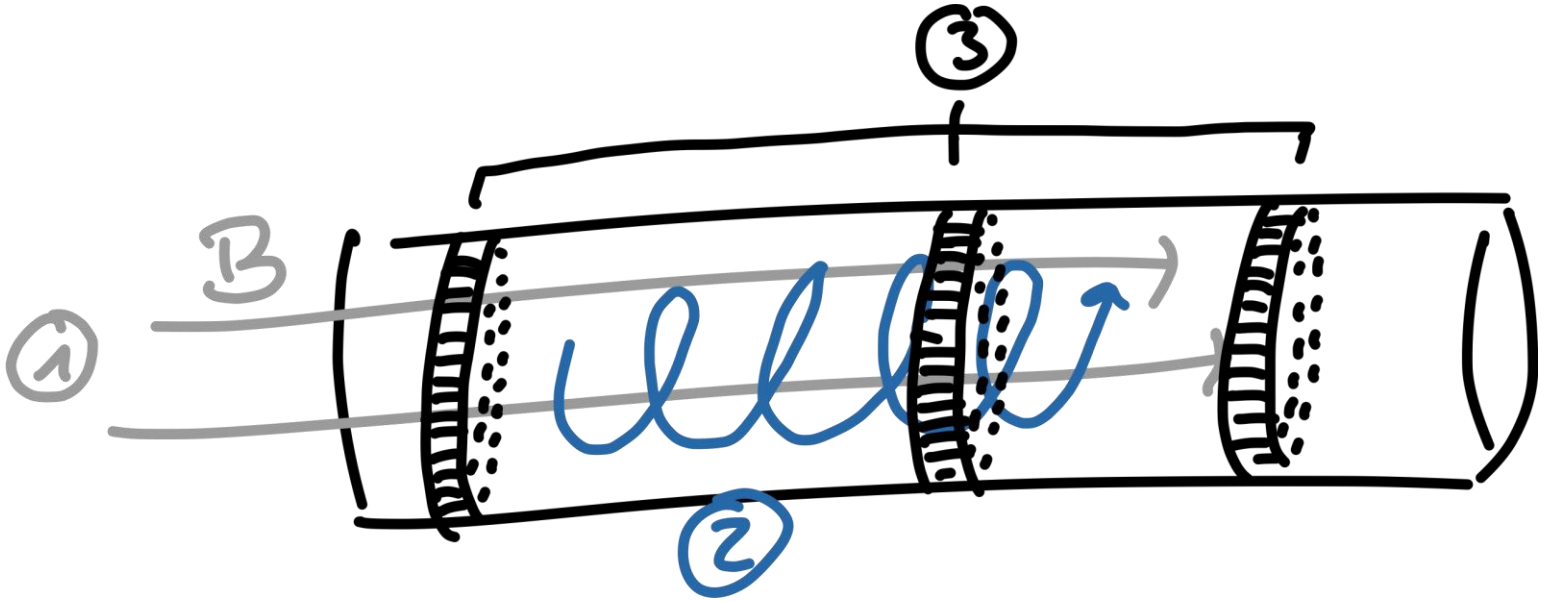
- Bildung über Positronium (Ps)



-AEgIS

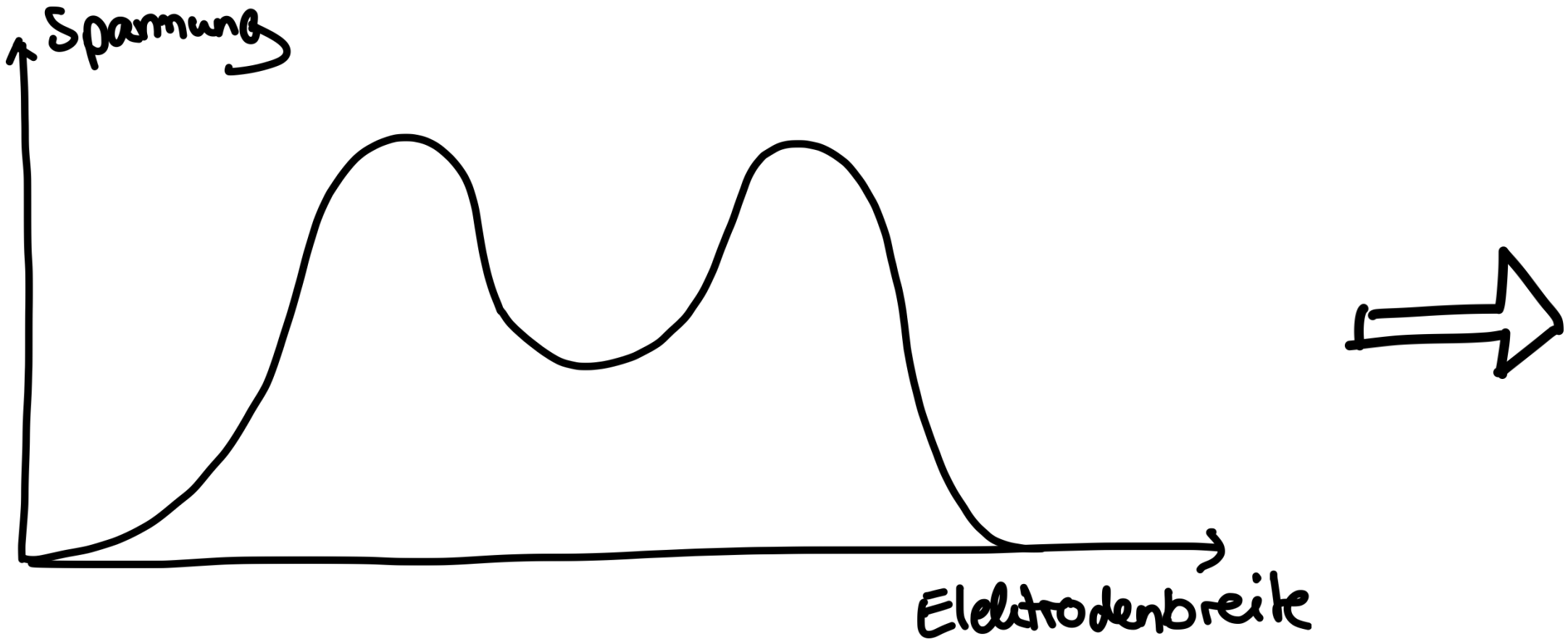

Breadbox
Positron accumulator
e+
N2(l) at 77k
N2(l) at 77K
1T Magnet
5T Magnet
Electrodes
He(l) at 4K
He(l) at 4K
Camera
MCP
SUN
Starship
Hedgehog
ELENA
p̄
Relevant für mich

-Mechanismus der Falle-

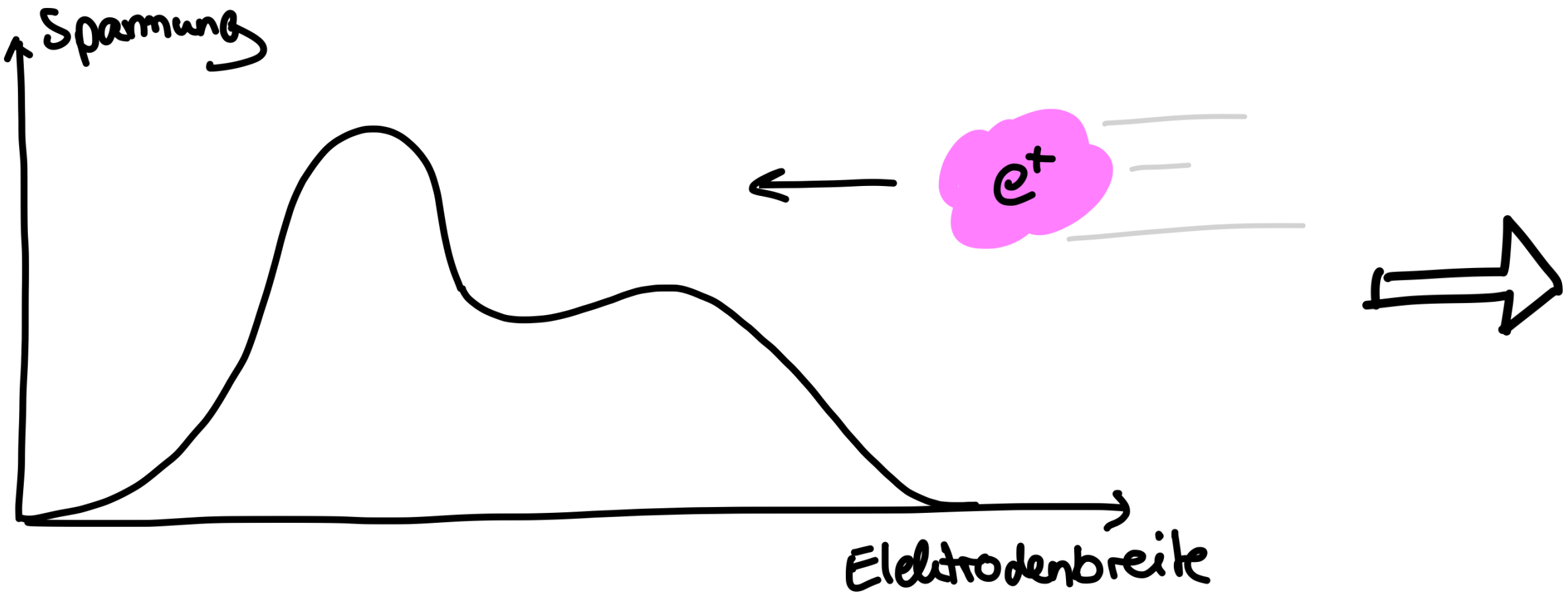


1) Magnetfeld
2) e^+ Bewegung
3) Elektroden

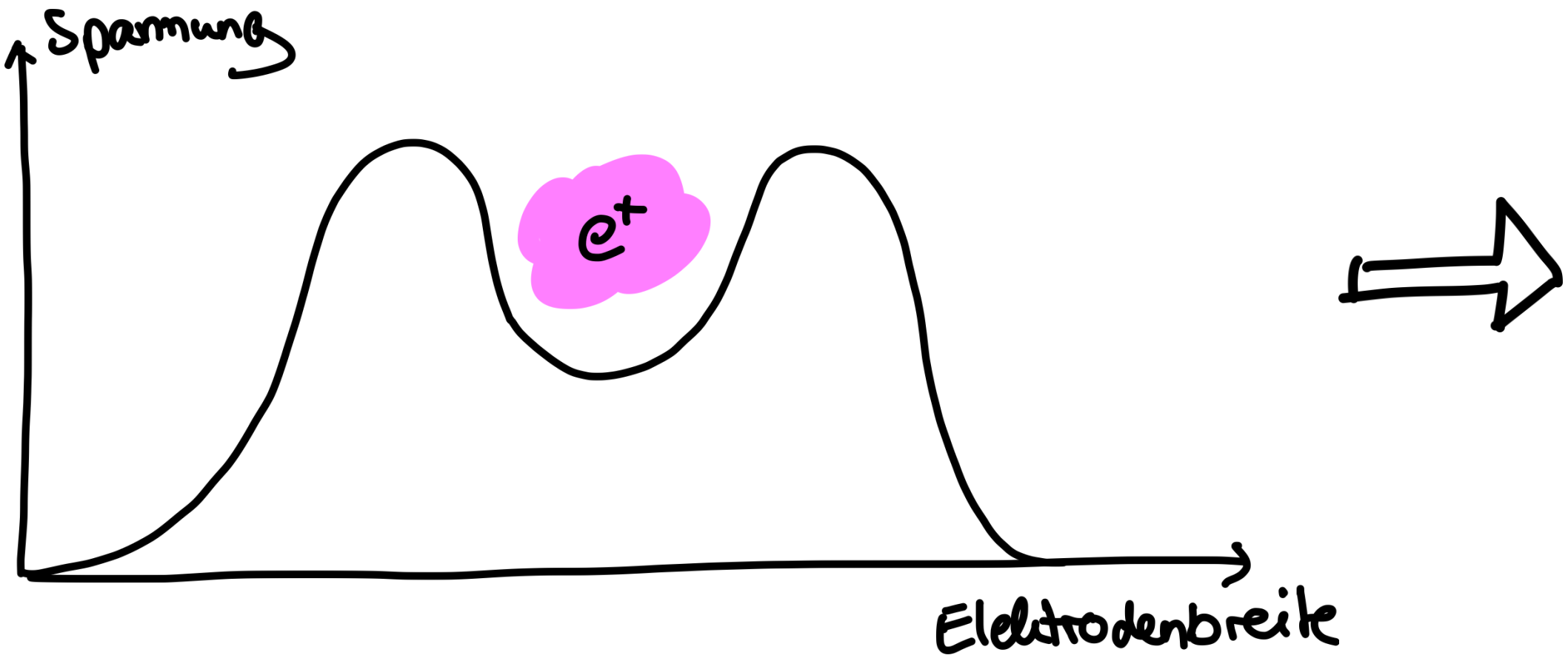
-Ablauf-



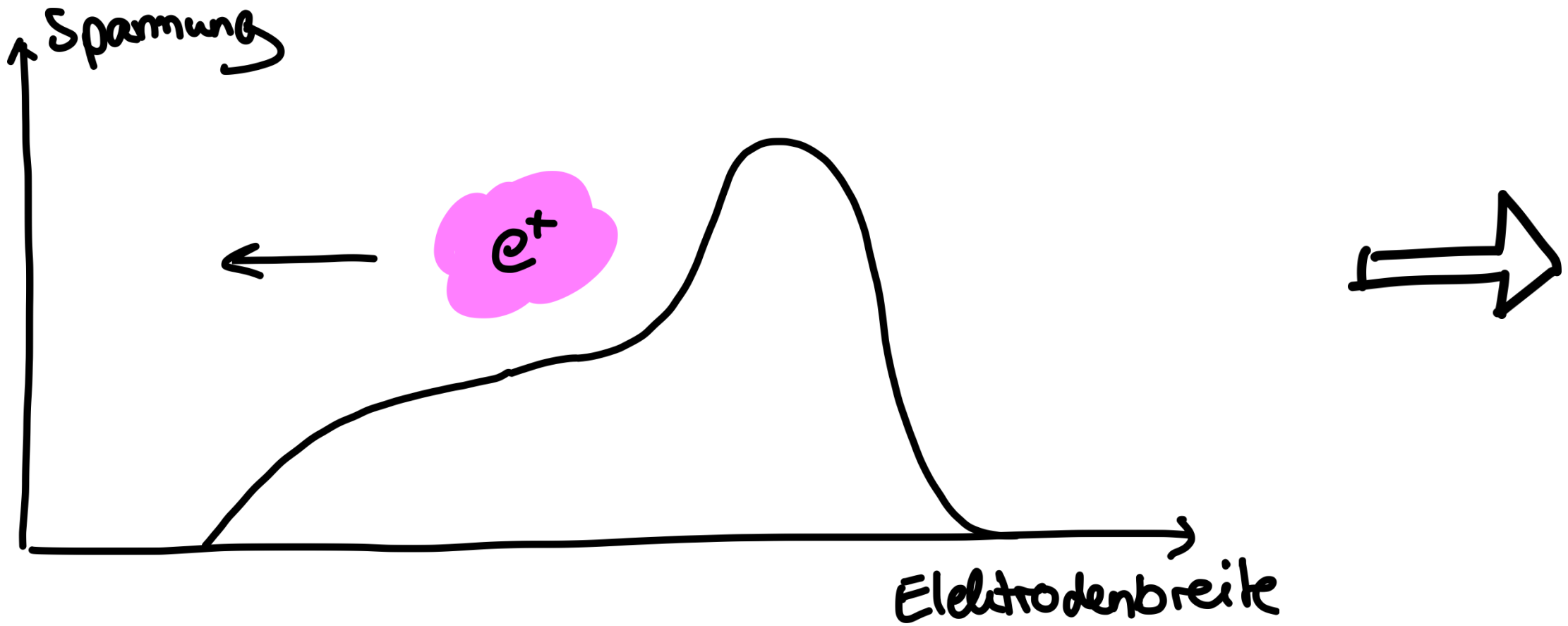
-Ablauf-



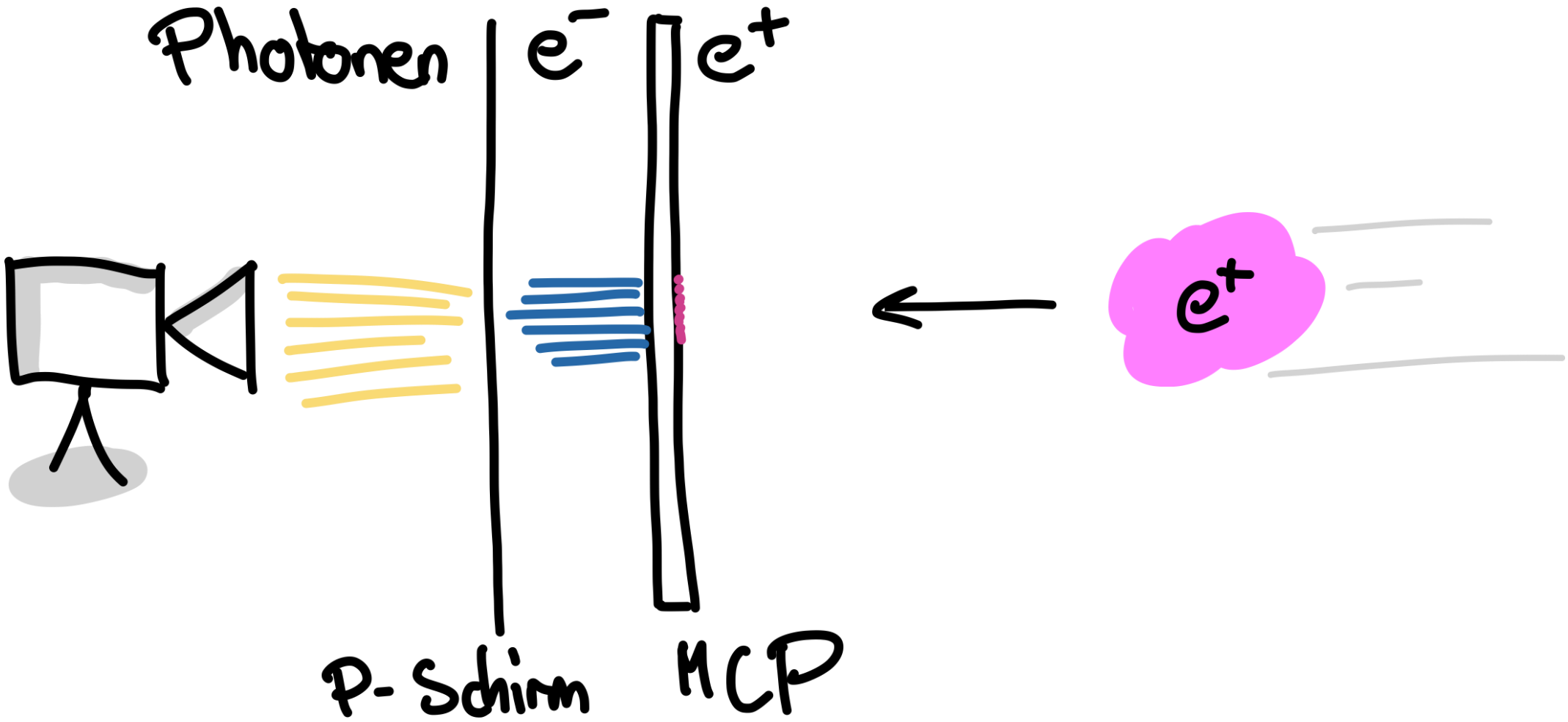
-Ablauf-



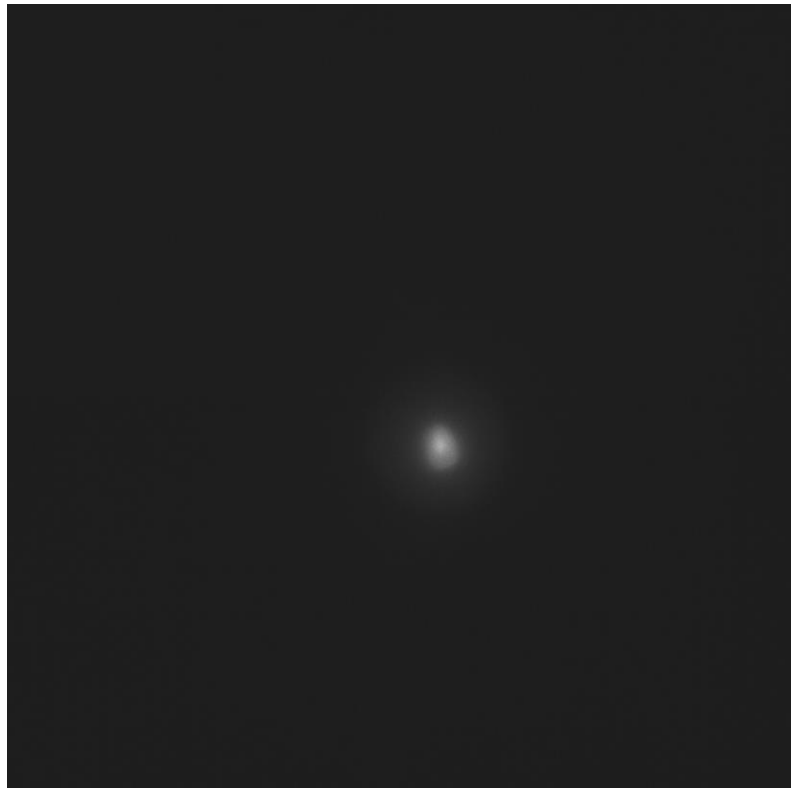
-Ablauf-

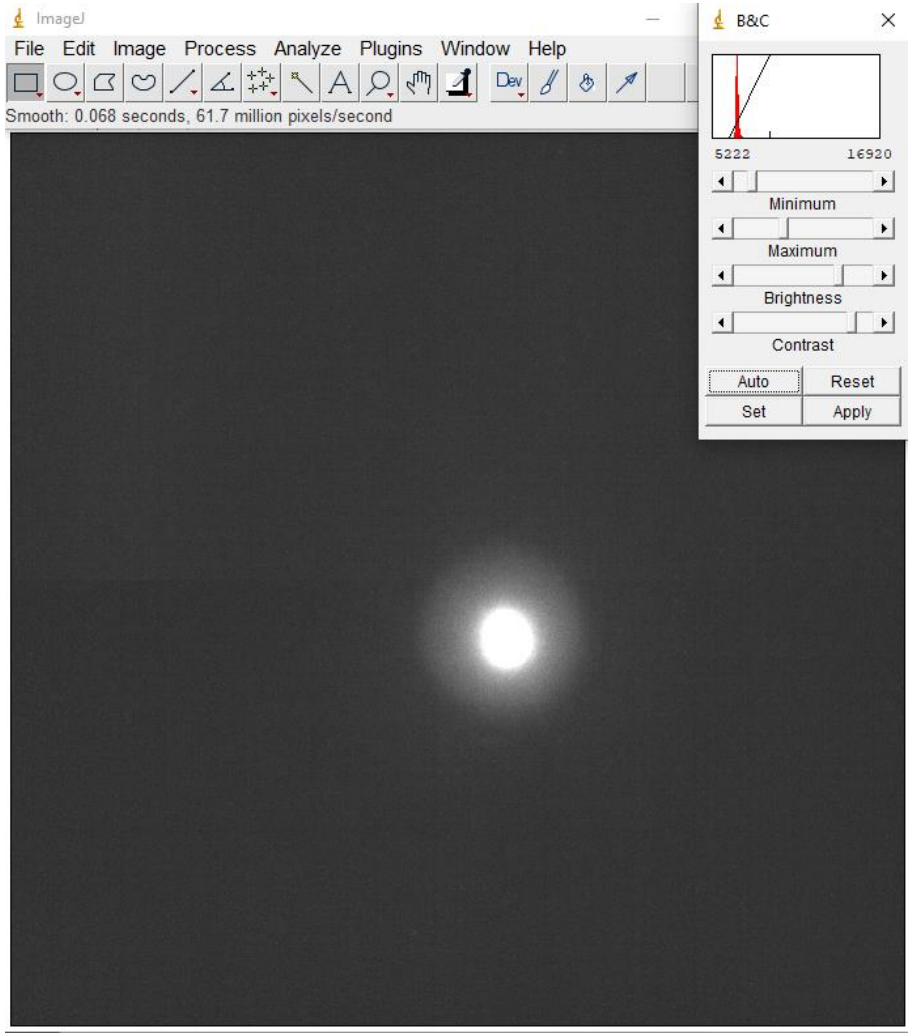


-Ablauf-

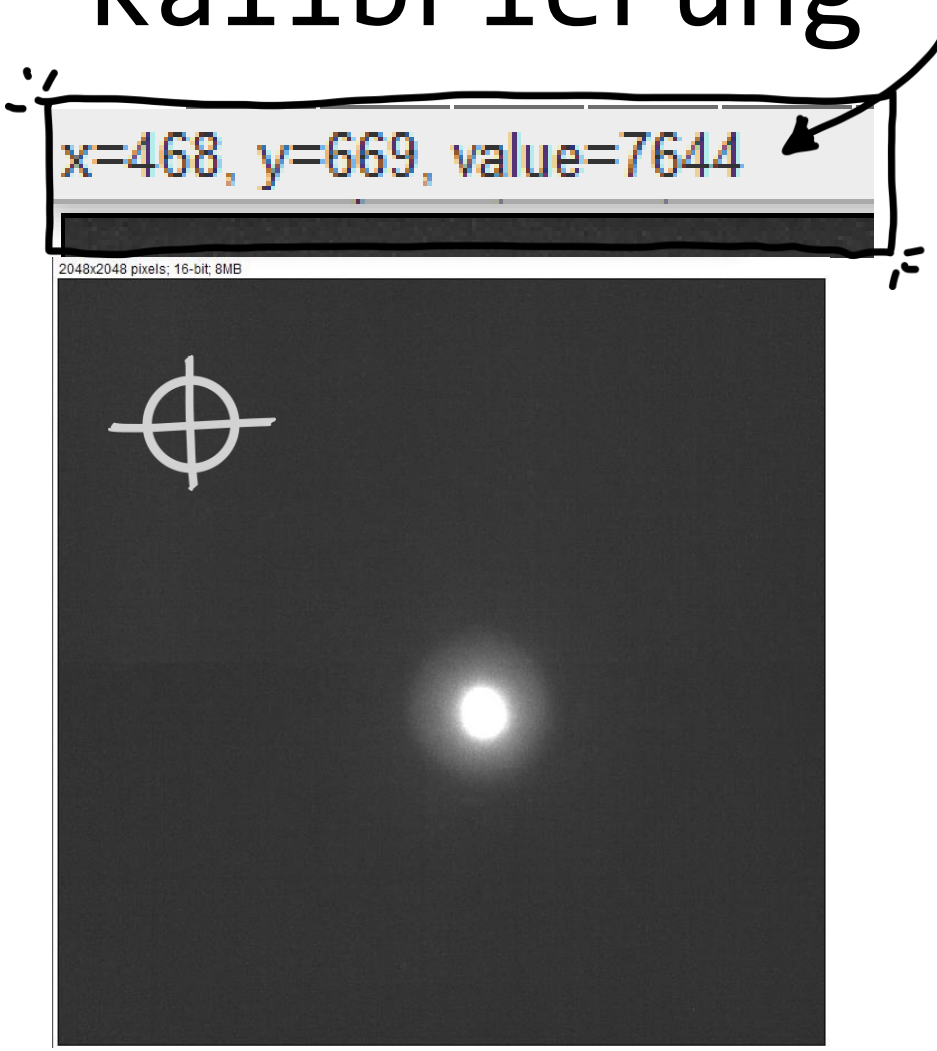


-Kalibrierung-

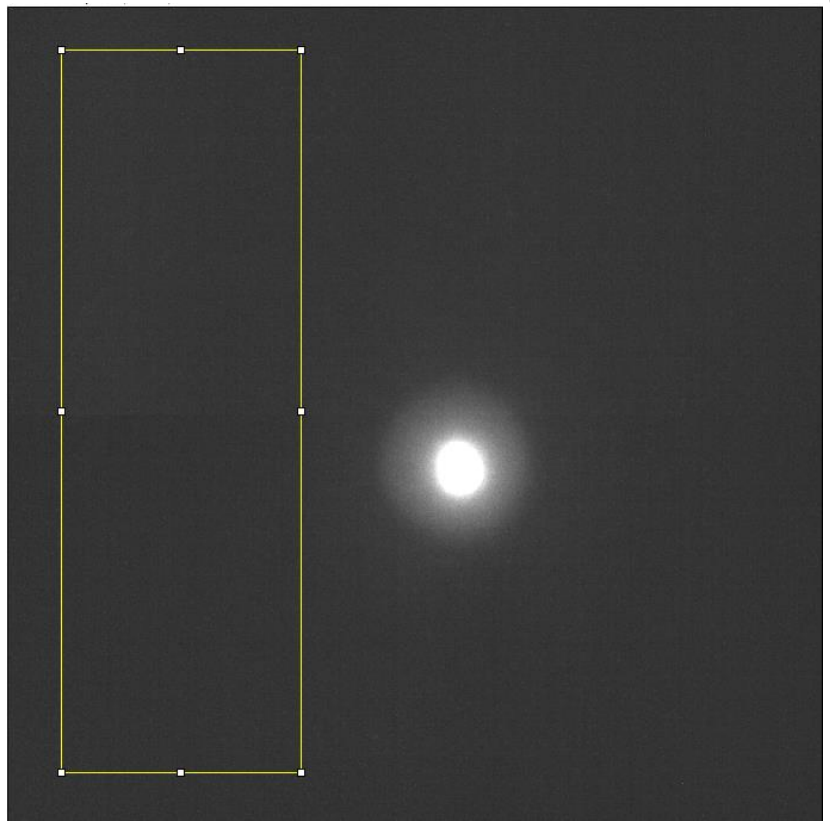




-Kalibrierung-



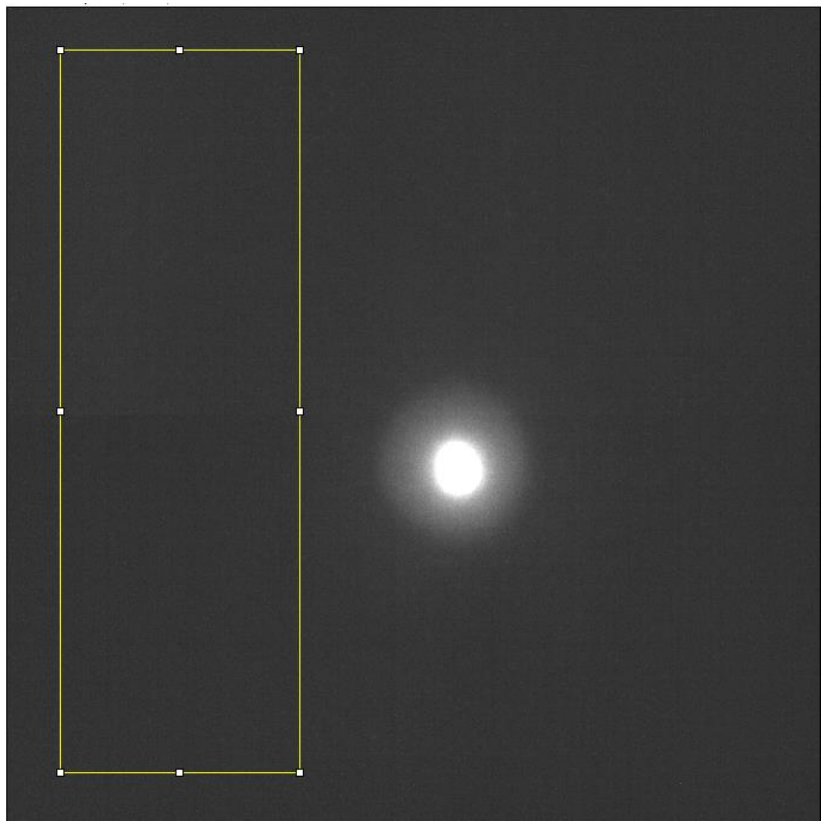
Area	Mean	Min	Max	IntDen
1096254	7648.905	6990	8847	8385142748.000



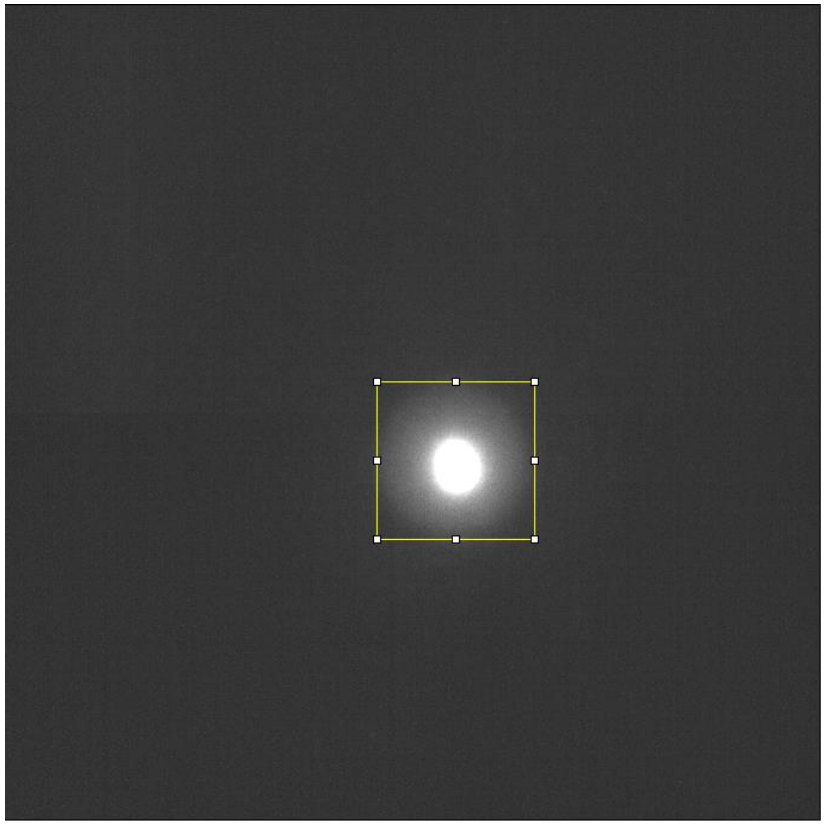
$$\frac{Area}{IntDen} = 7648$$

-Kalibrierung-

Area	MeanBG	Min	Max	IntDen
1096254	7648.905	6990	8847	8385142748.000



Area	MeanSignal	Min	Max	IntDen
156816	11136.211	7481	45213	1746336090.000

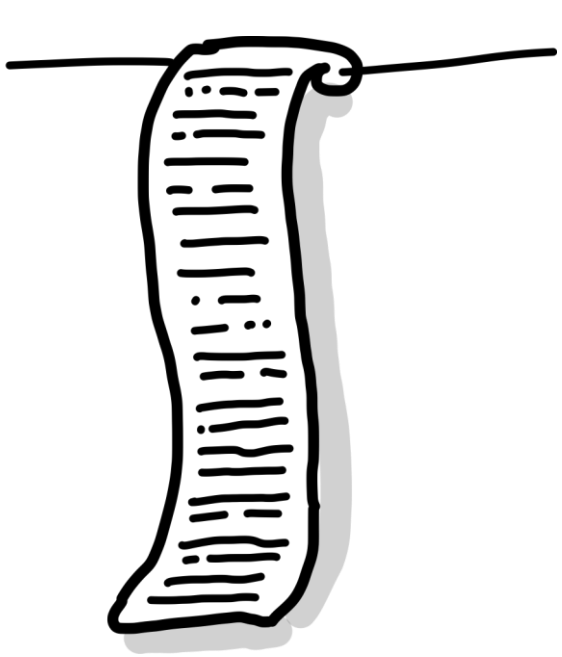


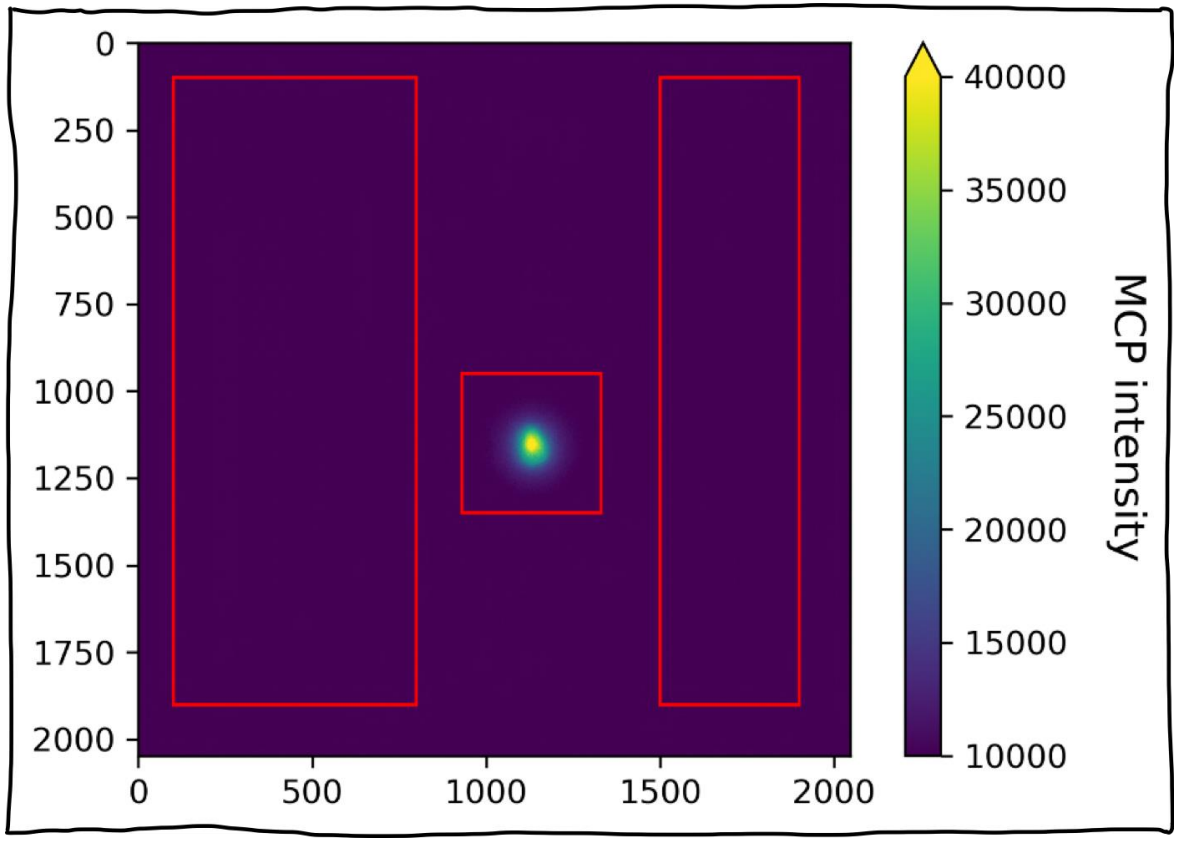
$$\frac{MeanBG}{MeanBG} = normBG = 1$$

$$\frac{MeanSignal}{MeanBG} - 1 = normSignal$$

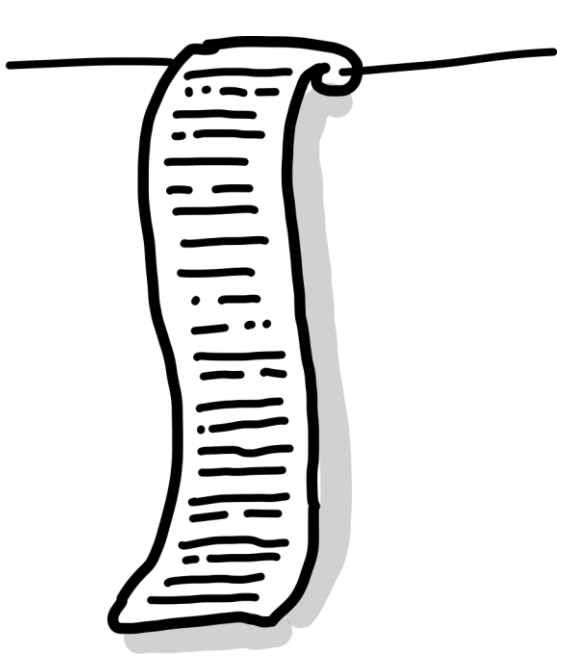
$normSignal$: $ca.\,1{,}06$

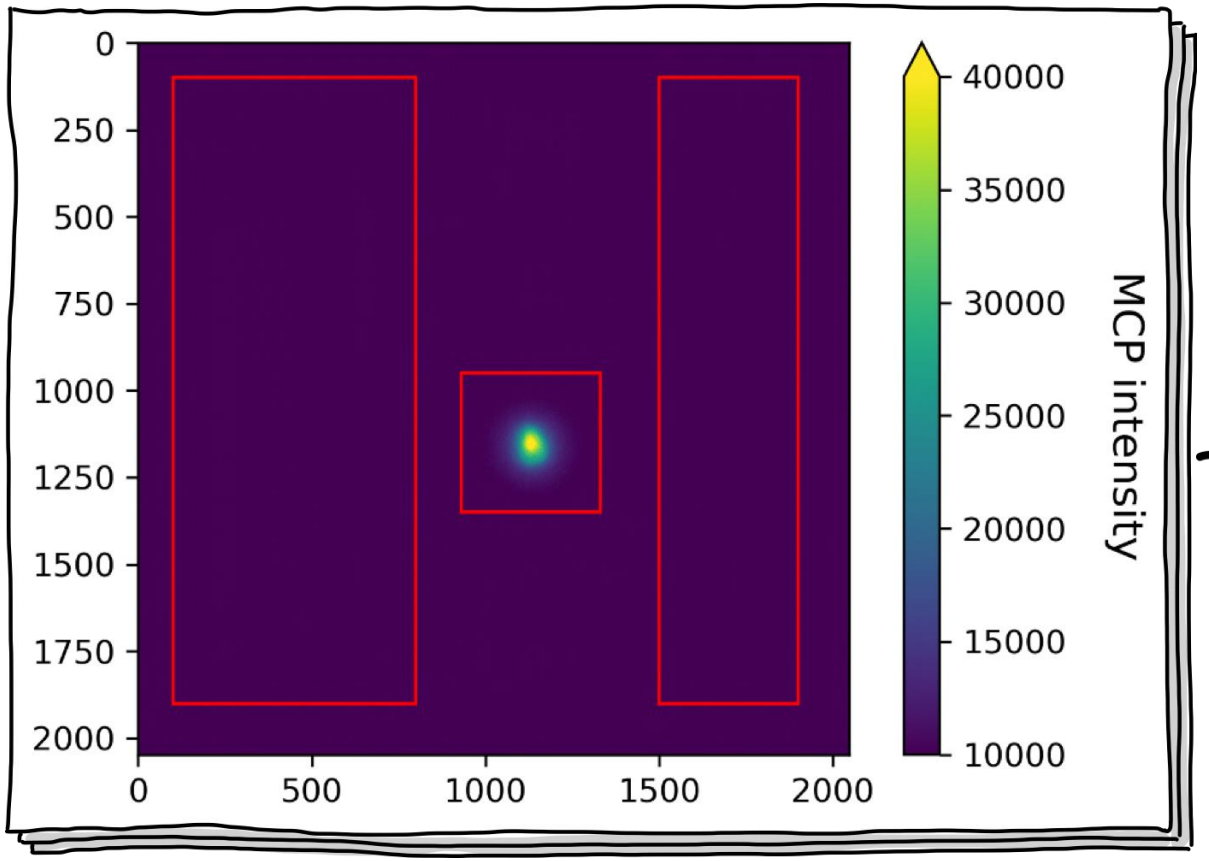
-Kalibrierung-





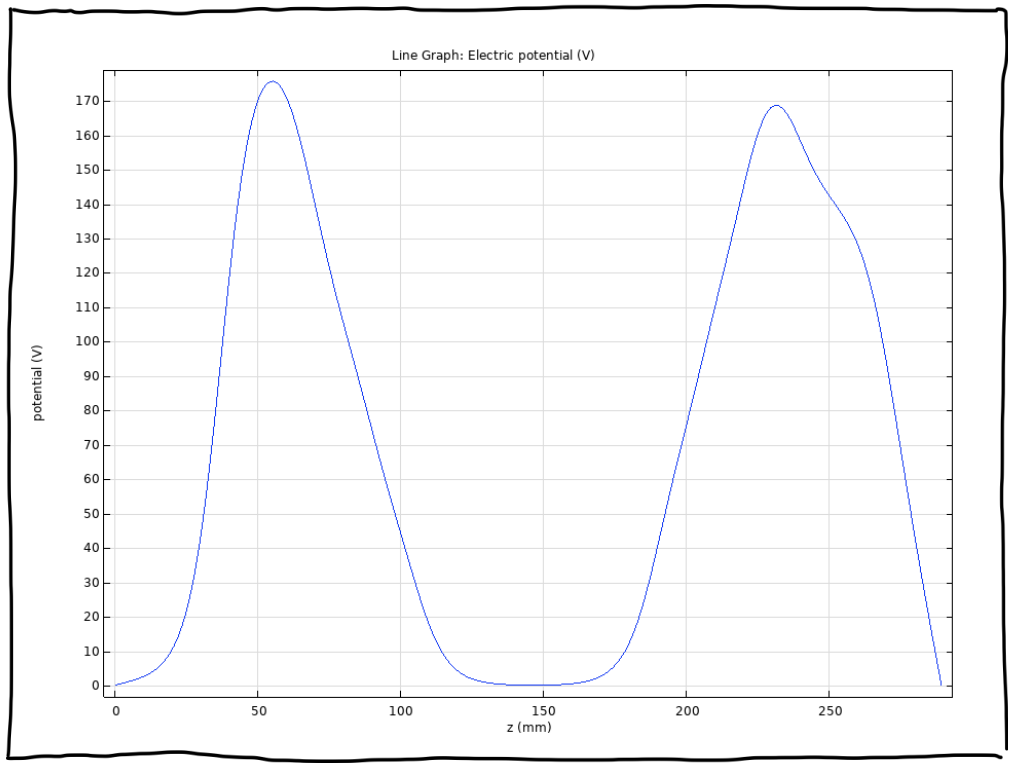
-Kalibrierung-

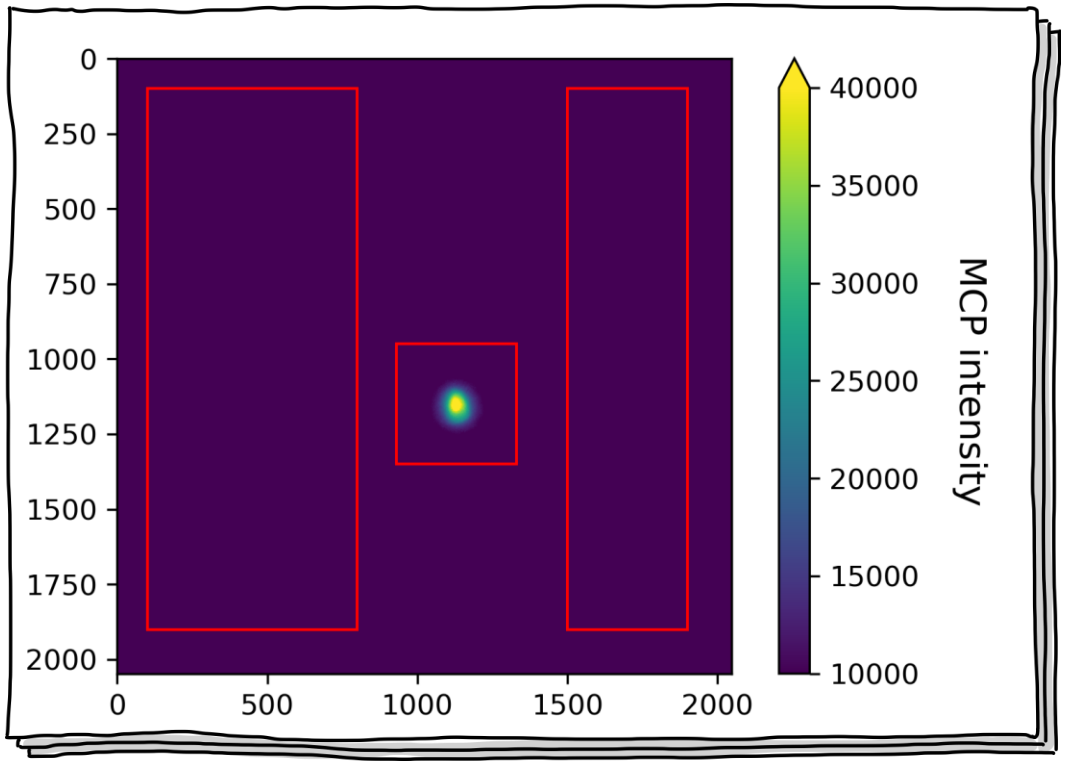




$$\mu(normSignal) = 1{,}13 \pm 0{,}03$$

-Fangen-

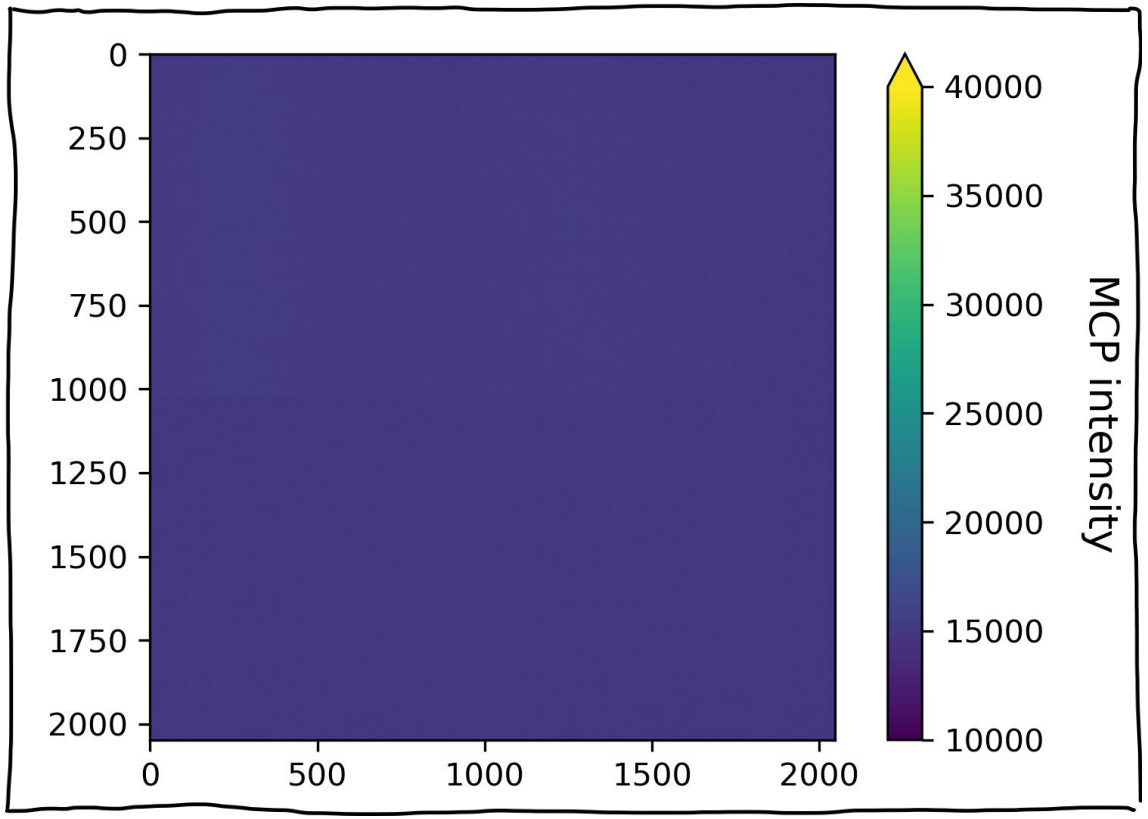




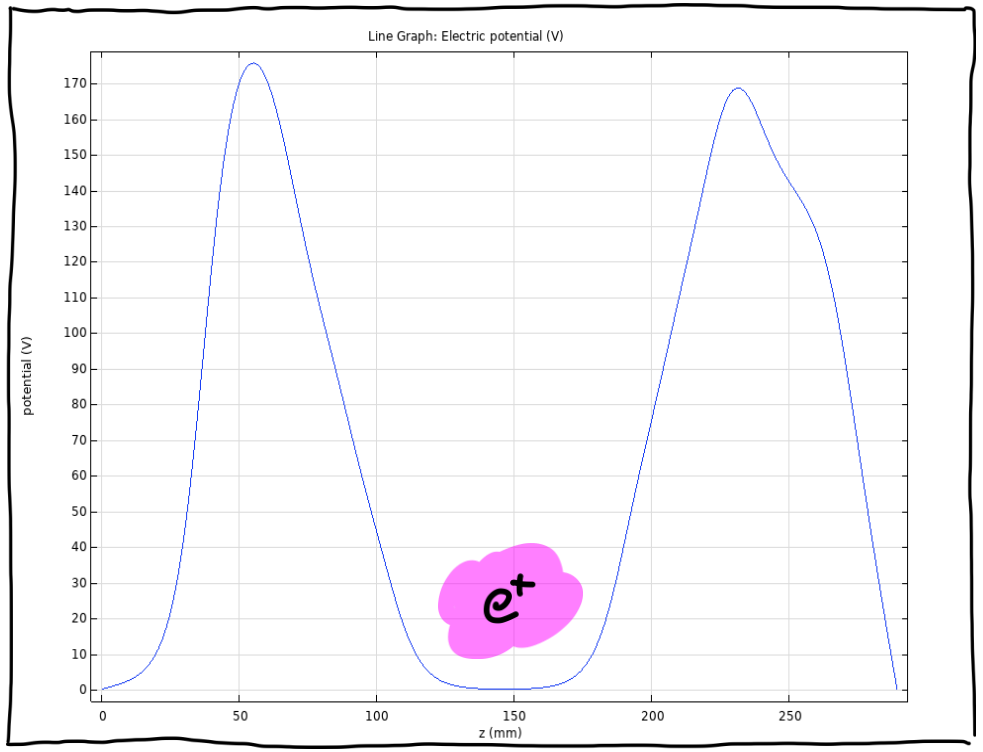
$\mu(normSignal) = \ 0{,}46 \pm 0{,}04$

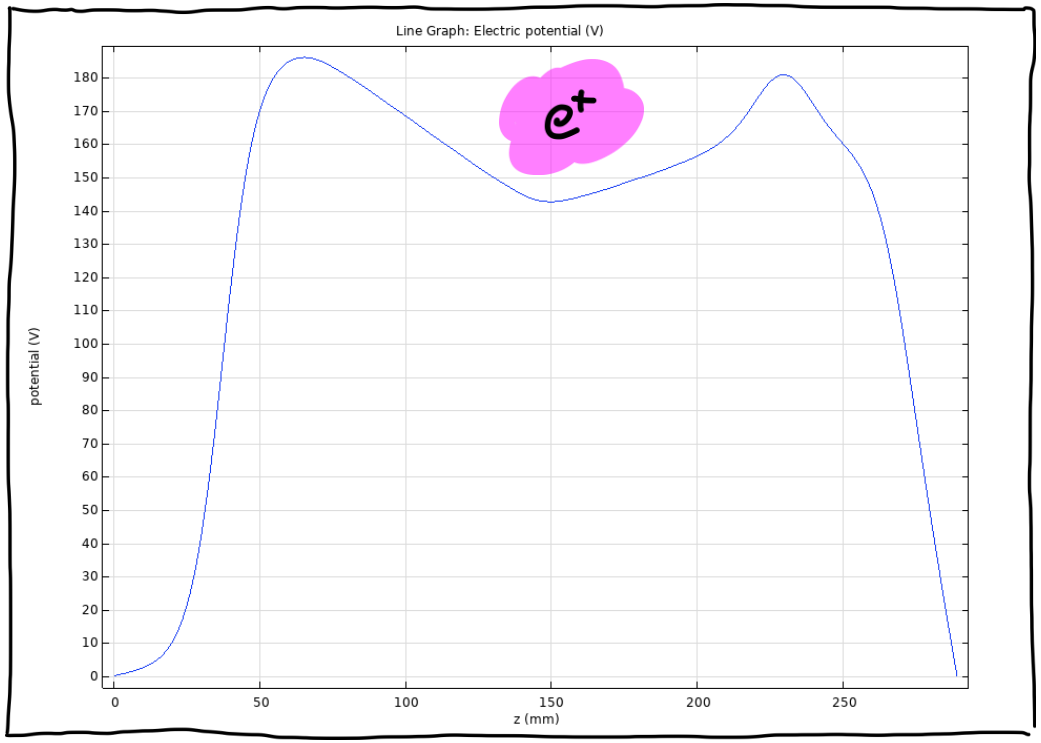
~40% der Ausgangsmenge

-Fangen-


0
250
500
750
1000
1250
1500
1750
2000
0
500
1000
1500
2000
40000
35000
30000
25000
20000
15000
10000
MCP intensity

-Ausblick-


Line Graph: Electric potential (V)
potential (V)
z (mm)
e+


Line Graph: Electric potential (V)
potential (V)
z (mm)
e+


e+ gefangen