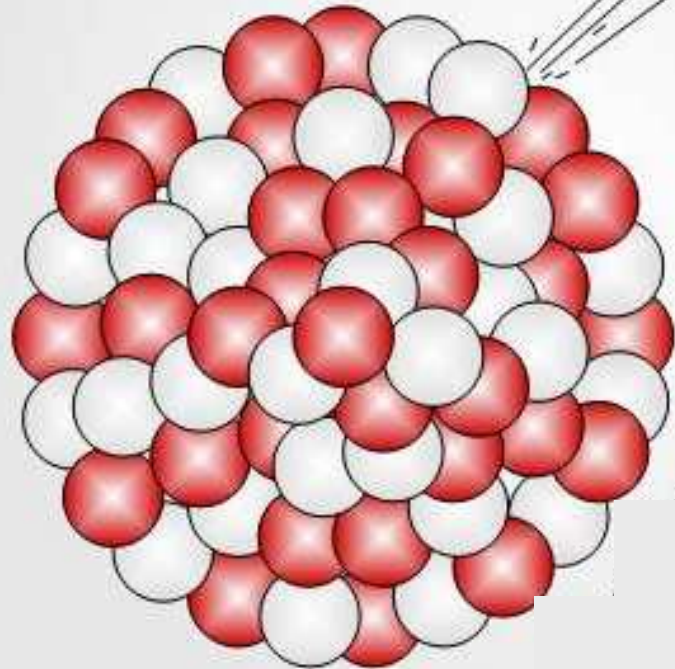




## Der Beta-Minus Zerfall

Beta-  
Strahlung



$e^{-}$

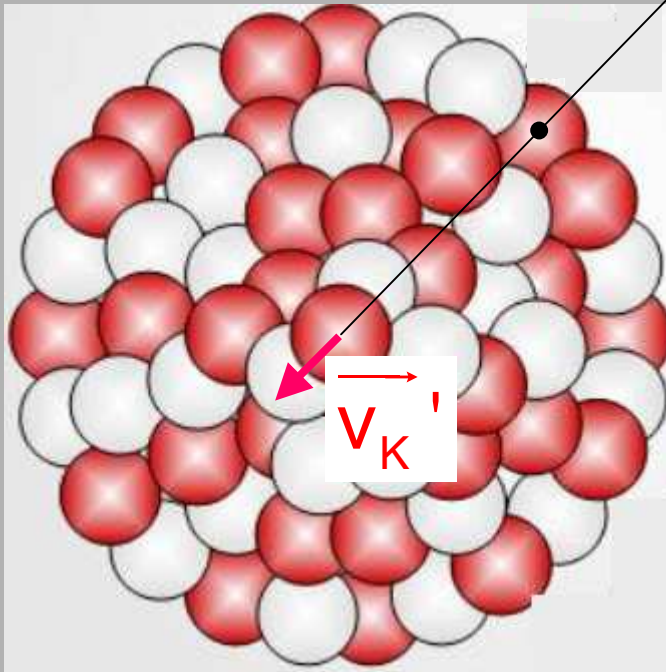
Wie kann  
das sein?





## Der Beta-Zerfall

## Impulserhaltung



$$\vec{P} = \vec{P}'$$

$$\vec{0} = \vec{P}_e' + \vec{P}_K' \Rightarrow \vec{P}_e' = -\vec{P}_K'$$

$$\vec{0} = m_e \cdot \vec{v}_e' + m_K \cdot \vec{v}_K'$$

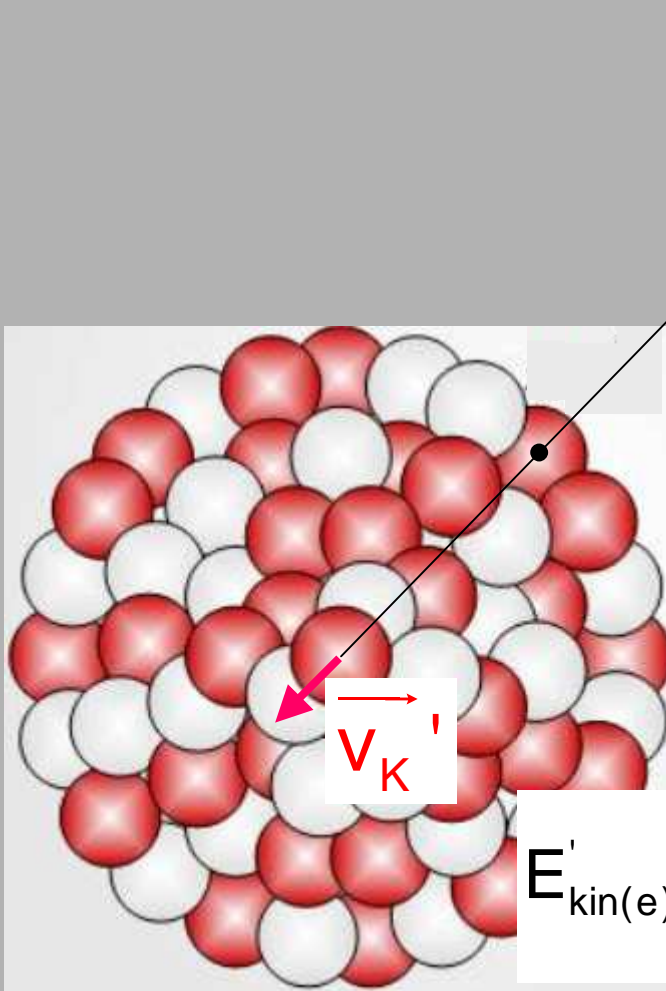
$$\vec{v}_e' = -\frac{m_K}{m_e} \cdot \vec{v}_K'$$

$$E'_{\text{kin}(e)} = \frac{(p_e')^2}{2m_e}$$

$$E'_{\text{kin}(K)} = \frac{(p_K')^2}{2m_K}$$



## Der Beta-Zerfall Energieerhaltung



$$E'_{\text{kin}(e)} + E'_{\text{kin}(K)} = E_0$$

$$E'_{\text{kin}(e)} = \frac{(p_e')^2}{2m_e} \quad E'_{\text{kin}(K)} = \frac{(p_K')^2}{2m_K}$$

$$E'_{\text{kin}(K)} = \frac{(p_e')^2}{2m_K}$$

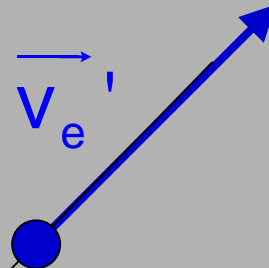
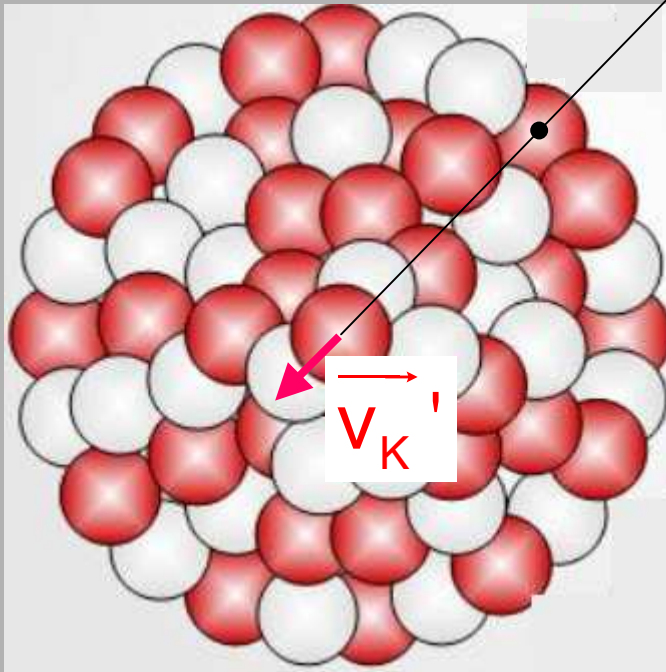
$$\frac{E'_{\text{kin}(e)}}{E'_{\text{kin}(K)}} = \frac{m_K}{m_e}$$

$$E'_{\text{kin}(e)} + \frac{m_e}{m_K} E'_{\text{kin}(e)} = E_0$$

$$E'_{\text{kin}(e)} = \frac{m_K}{m_e + m_K} E_0$$



## Der Beta-Zerfall Energieerhaltung



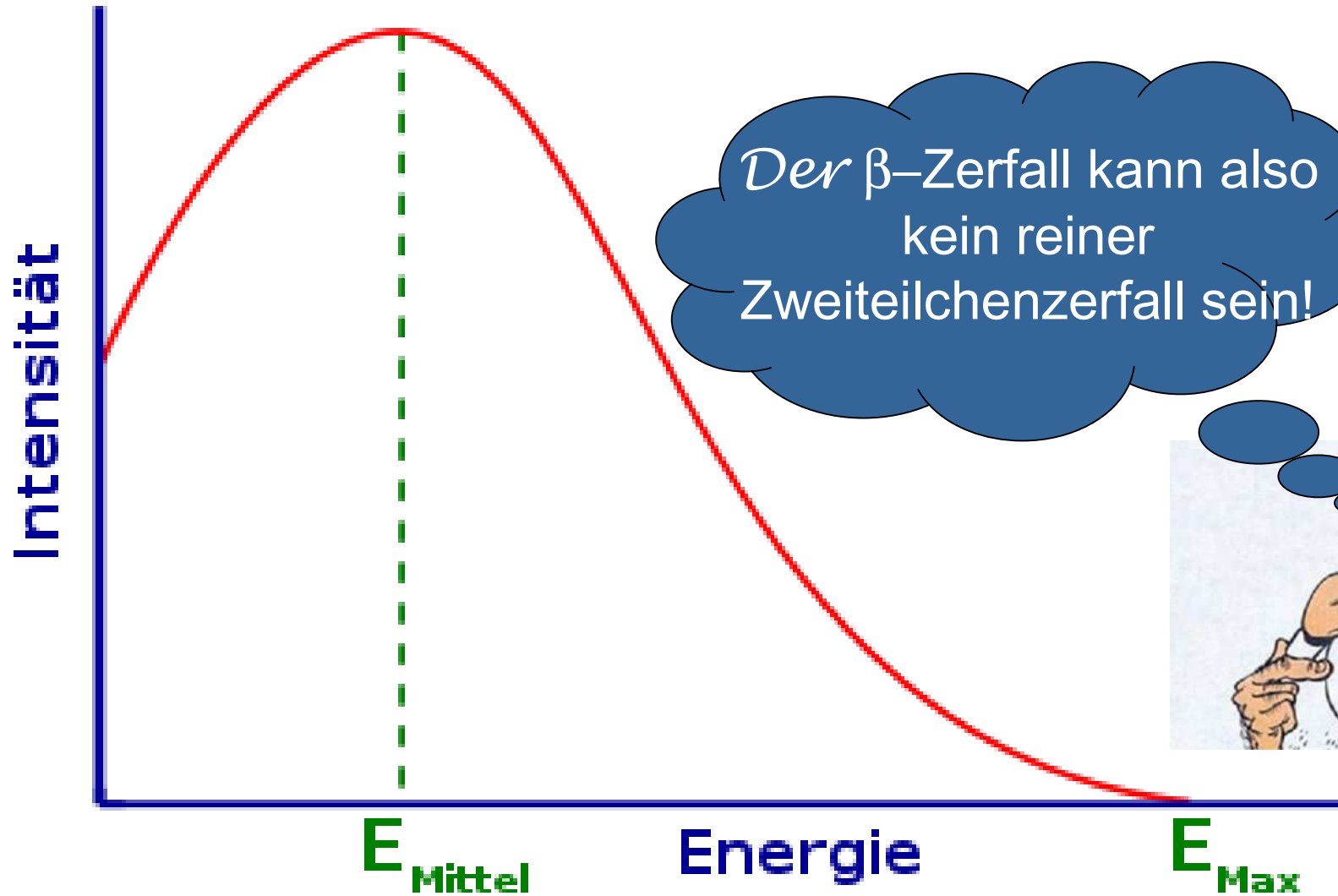
$$E'_{\text{kin}(e)} = \frac{m_K}{m_e + m_K} E_0$$

Die Elektronen  
müssten als immer  
die gleiche Energie  
haben!





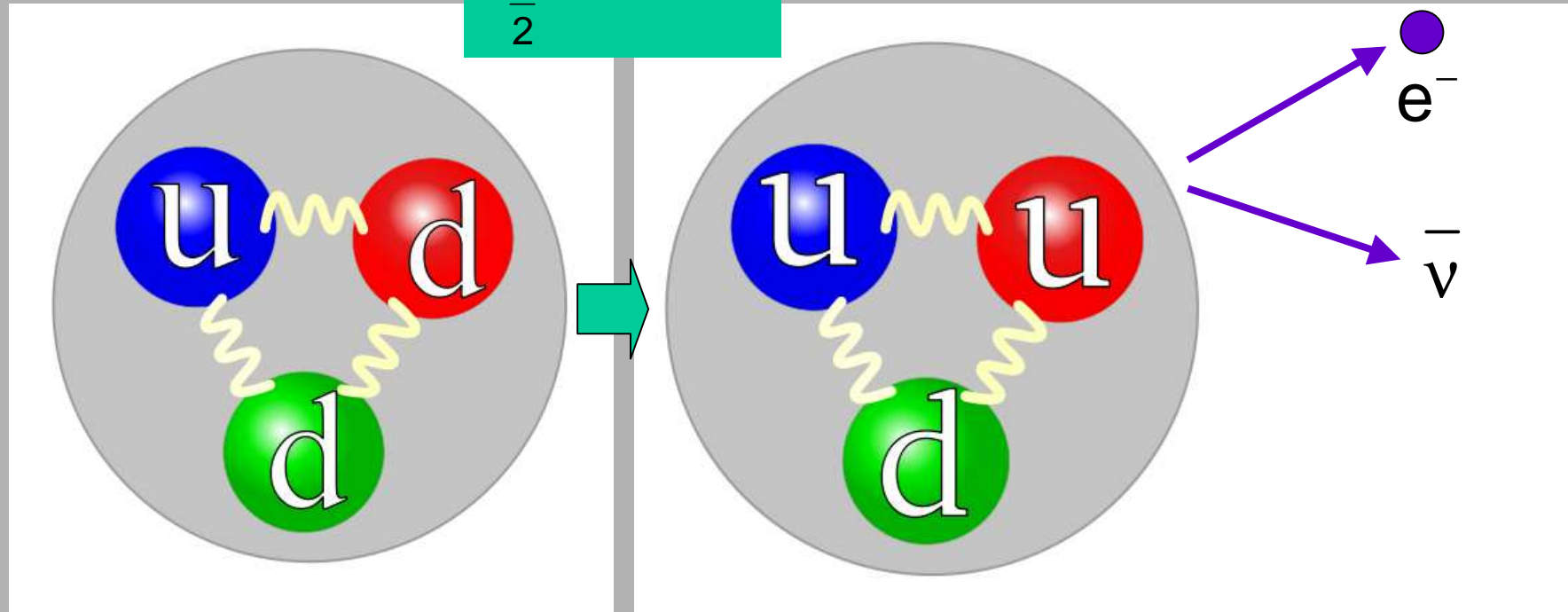
## Das Spektrum der $\beta$ -Strahlung





## Der Neutronenzerfall (freie Neutronen)

$$T_{\frac{1}{2}} \approx 886 \text{ s}$$





**PROGRAMM**  
Steigerung der Effizienz des  
mathematisch-naturwissenschaftlichen  
Unterrichts

*Cusanus-Gymnasium Wittlich*

*Physik – Kernphysik* Fachlehrer : *W. Zimmer*

