

Praktikum: P4 Gruppe: 22

☒ **Mo** ☐ **Mi**
Zutreffendes bitte ausfüllen

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Versuch: Mößbauer-Effekt

Betreuer: Paras Koundal Durchgeführt am: 29.11.20

Wird vom Betreuer ausgefüllt.

1. Abgabe am: _____

Rückgabe am: _____ Kommentar:

2. Abgabe am: _____

Ergebnis: + / 0 / - Handzeichen: _____

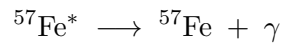
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1. Theory & Preparation

1.1 Mössbauer-effect

The process of **resonant absorption** in nuclear physics describes the phenomenon of subsequent de- and excitation of two equal atoms to the same energy levels via one γ -quant. Consider for example an excited state of ^{57}Fe , that emits a photon with energy (roughly) 14.4 keV during its transition to the ground state.



In principle, one could use this emitted photon to excite another ^{57}Fe atom to the higher energy state. The photon is absorbed resonantly by the atom during this process.

In reality, resonant absorption such as the Na-D-line only occurs under certain circumstances. Due to conservation laws the energy E_γ of the emitted photon does not exactly equal the transition energy E_0 , but is instead shifted downward by the nuclear recoil energy. A similar analysis finds that the energy for absorption of the same atom is shifted upwards.

$$\underbrace{E_\gamma = E_0 - \frac{p_\gamma^2}{2m}}_{\text{Emission}} \qquad \underbrace{E_\gamma = E_0 + \frac{p_\gamma^2}{2m}}_{\text{Absorption}} \qquad (1.1)$$

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2. Experiment & Evaluation